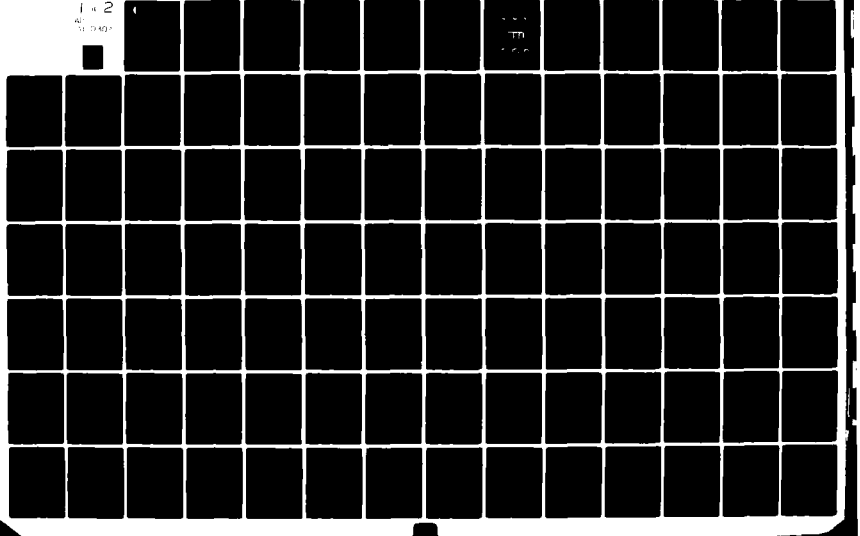
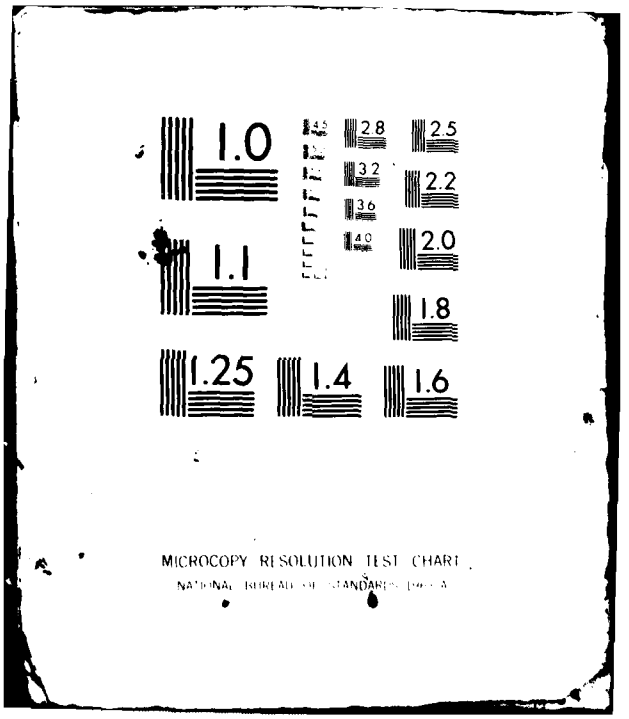
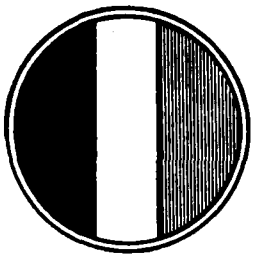
AD-A110 307 ARMY TRADOC SYSTEMS ANALYSIS ACTIVITY WHITE SANDS MIS--ETC F/G 5/2
PILOT ECONOMIC ANALYSIS OF LIBRARY CIRCULATION SYSTEMS.(U)
JUN 81 J A HAWTHORNE, N M STEFONEK
UNCLASSIFIED TRASANA-TD-26-81 SBI-AD-F050 013 NL




1.0
1.1
1.25
1.4
1.6
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.8
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS



LEVEL III ACN 60616

(2)

TRASANA-TD-26-81

PILOT ECONOMIC ANALYSIS OF LIBRARY CIRCULATION SYSTEMS

JUDY ANN HAWTHORNE

NOREEN M. STEFONEK

AD A110307

DTIC SELECTE FEB 1 1982 H

DTIC FILE COPY

JUNE 1981

TECHNICAL DOCUMENTATION

Approved for public release;
distribution unlimited.

DEPARTMENT OF THE ARMY
US ARMY TRADOC SYSTEMS ANALYSIS ACTIVITY
WHITE SANDS MISSILE RANGE
NEW MEXICO 88002

82 [illegible] 144

DISPOSITION

This report was prepared by the US Army TRADOC Systems Analysis Activity under the guidance of the US Army Training and Doctrine Command. Distribution is controlled by and permission to release must be obtained from the US Army Training and Doctrine Command, Fort Monroe, Virginia, ATTN: ATCS-D, AUTOVON 680-2409.

DISCLAIMER

The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision unless so designated by other official documentation.

WARNING

Information and data contained herein are based on the input available at the time of preparation. The results are subject to change and should not be construed as representing the US Army Training and Doctrine Command unless so specified.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER TRASANA-TD-26-81	2. GOVT ACCESSION NO. AD A110 307	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* Pilot Economic Analysis of Library Circulation Systems		5. TYPE OF REPORT & PERIOD COVERED Technical Documentation 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Judy A. Hawthorne and Noreen M. Stefonek		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS US Army TRADOC Systems Analysis Activity ATTN: ATAA-SL White Sands Missile Range, NM 88002		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS ACN 60616
11. CONTROLLING OFFICE NAME AND ADDRESS US Army Training and Doctrine Command ATTN: ATPL-AOT Ft Monroe, VA 23651		12. REPORT DATE June 1981 13. NUMBER OF PAGES 128 pages
14. MONITORING AGENCY NAME & ADDRESS(*if different from Controlling Office*)		15. SECURITY CLASS. *(of this report)* Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Library Circulation Systems
Economic Analysis
Computerized Library System
Costs
Effectiveness

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The results of a study which derived the costs and effectiveness of several local manual circulation systems and a vendor supplied automated circulation system are presented. Included is a detailed methodology for deriving the operating costs of library services and guidelines from concept development through the initiation of a request for approval to purchase ADPE.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

ACKNOWLEDGEMENTS

This project could not have been completed without the cooperation and assistance of the following individuals:

Mrs. Cynthia Banicki and staff, Ft. Bliss Morale Support Library.

Ms. MaryJean Murray and staff, USA Sergeants Major Academy Learning Resources Center.

Mrs. Delfina Galloway and staff, USA Air Defense School Library.

Mrs. Laurel B. Saunders and staff, White Sands Technical Library.

Mrs. Eula B. Curtsinger and staff, White Sands Morale Support Library.

The staff, USA TRADOC Systems Analysis Activity Technical Library.

Ms. JoAn Stolley, TRALINET Systems Center.

LTC Thomas H. Daly, Jr., Resource Management Division, USA TRADOC Systems Analysis Activity.

Mr. Floyd A. Wood and staff, Systems Programming & Computer Operations Branch, USA TRADOC Systems Analysis Activity.

Mr. Garnett A. Potter, *Special Assistant - Evaluation*, USA TRADOC Systems Analysis Activity.

Mr. Richard C. Risser, Training Effectiveness Analysis Branch II, USA TRADOC Systems Analysis Activity.

Mr. Patrick D. Cassady, PhD, Training Effectiveness Analysis Division, USA TRADOC Systems Analysis Activity.

Mr. Richard E. Luce, Boulder Public Library.

Mrs. Ruth Jackson, Denver Public Library.

Accession For
NTIS GRA&I ☑
DTIC TAB ☐
Unannounced ☐
Justification
PER LETTER
By ON FILE
Distribution/
Availability Codes
Dist | Avail and/or Special
A

DTIC
COPY INSPECTED
3

TABLE OF CONTENTS

	Page
SUMMARY	*xi*
INTRODUCTION	1
Background	1
Objectives	1
Scope	3
Alternatives	3
METHODOLOGY	4
Manual Circulation	4
Automated Circulation	4
CURRENT SYSTEMS	4
AUTOMATED SYSTEM	4
COMPARATIVE EFFECTIVENESS OF SYSTEMS	5
Selective Dissemination of Information	7
Collection Duplication	8
Conversion	9
TRADOC Libraries Conversion	10
DARCOM Libraries Conversion	11
COMPARATIVE COST OF SYSTEMS	12
UNCERTAINTIES	12
SDI Program	12
Methodology	13
PREPARATION OF CONCEPT PAPER AND JUSTIFICATION	13
Justification	13
FINDINGS	14
RECOMMENDATIONS	14

Table of Contents (Continued)

Page

APPENDICES

A METHODOLOGY A-1

B DETAILED SYSTEMS DESCRIPTION AND DATA B-1

Current Systems Descriptions B-1

TRASANA Technical Library B-1
White Sands Technical Library B-1
White Sands Morale Support Library B-2
Sergeants Major Academy Learning Resources Center B-2
Ft. Bliss Morale Support Library B-2
Air Defense School Library B-3

Current and Proposed System Data B-3
Manual Systems Data B-4
Automated System Data B-7
Automated Circulation System Costs B-10

C EFFECTIVENESS COMPARISON C-1

Selective Dissemination of Information C-1
Collection Duplication C-9

D FT BLISS/WHITE SANDS AUTOMATED CIRCULATION SYSTEM CONCEPT PAPER D-1

E AR 18-1 JUSTIFICATION TO ACQUIRE STANDARD ADPE E-1

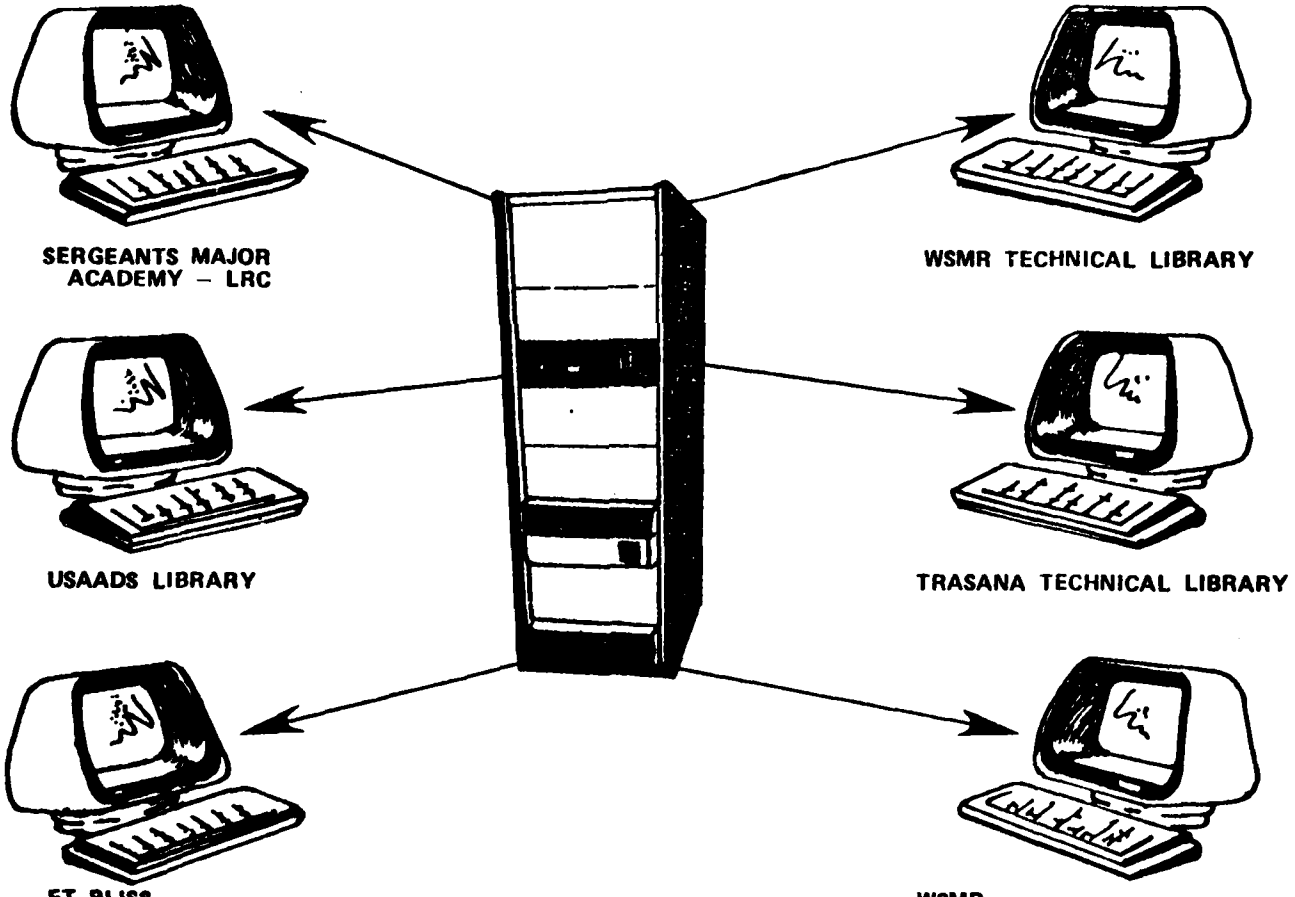
BIBLIOGRAPHY

ACRONYMS

GLOSSARY

DISTRIBUTION LIST

PROPOSED FT BLISS/WHITE SANDS AUTOMATED
CIRCULATION SYSTEM



SUMMARY

This report presents the US Army TRADOC Systems Analysis Activity (TRASANA) analysis of selected library circulation systems, and documents the methodology developed for analyzing such systems.

"Pinning down the cost of any one activity by extracting it from the total cost would be a challenge even to a mathematician who could explain the theory of relativity."[1] The present circulation systems of the six libraries are composed of a variety of manual and batch systems. Four of the libraries utilize the Gaylord Model C Book Charger. Using this machine, a date due and borrower registration number are imprinted on a book card and the date due is stamped on a borrower's card. The book card and borrower's card are maintained on file in the library. The Ft Bliss Morale Support Library uses the BRODAC Circulation System which makes a thermographic copy of the book card, patron card, and transaction card. Two systems are used at the TRASANA Technical Library, a manual two book card system and an automated batch system. The White Sands Missile Range Technical Library uses the Gaylord system as well as a form on which the basic bibliographic information is typed. The proposed automated system is a fully inter-active, off-the-shelf inventory and circulation control system supported by a minicomputer with networking capability for up to 35 dedicated terminals as well as dial-up access.

A timing study was conducted from December 1980 through March 1981 by each library to collect the required data on the manual systems. Data for the automated system were extrapolated from various sources. A methodology was developed to calculate the costs for the various types of circulation transactions.

Various areas where automation could significantly enhance library operations and services are identified and discussed. Two major areas of effectiveness were studied: the Selective Dissemination of Information (SDI) Program and collection duplication. A valid mission requirement was found for a SDI Program which would save each library patron an average of 4.8 hours/month. A collection duplication factor of 48.8% was found. The three major methods for conversion of manual records into a machine-readable format are "on-the-fly", in-house, and contract. The TRADOC libraries in the proposed network will use the in-house method while the DARCOM libraries will convert by the "on-the-fly" method.

The first two steps toward the procurement of an automated data processing system are discussed. Included are examples of the necessary documentation.

Major analysis findings and recommendations are:

- *The operating costs of the proposed library network in the automated mode are less costly than in the manual mode by $19,853.55 and would save 3.22 man-years per year.*

---

[1] *Randall, G. E. and J. G. Oxton, "A Mechanized Library Ten Years Later," Special Libraries, volume 64/2, February 1973, p 79.*

- *The automated system is more effective than the manual systems in that the library personnel will be allowed more time to perform their professional duties especially in the reference area.*

- *The methodology in appendix A is a viable method for calculating the operating costs of library services and is recommended as a tool for analyses in future studies by TRADOC libraries.*

TRASANA TD-26-81

PILOT ECONOMIC ANALYSIS OF LIBRARY CIRCULATION SYSTEMS

INTRODUCTION

This report presents the US Army TRADOC Systems Analysis Activity (TRASANA) analysis of selected library circulation systems and documents the methodology developed for analyzing such systems.

Background

In 1979, the feasibility of fully automating the circulation systems at the TRASANA Technical Library was discussed with the US Army TRADOC Library Network (TRALINET) Systems Office. Because of the size of the collection, a stand-alone automated system was not considered economical; therefore, a second alternative was proposed. This alternative was that of networking the four TRADOC libraries located at Ft Bliss, Texas, and White Sands Missile Range, New Mexico - TRASANA Technical Library, US Army Sergeants Major Academy Learning Resources Center (SMA-LRC), US Army Air Defense School (USAADS) Library, and the Ft Bliss Morale Support Library.

In October 1980 a concept paper was developed by the librarians and informally approved by each library management. The Office of the Director, TRADOC Library System, reviewed the concept paper for its compatability with the modules detailed in TRADOC Regulation 1-2, "TRADOC Library System". Because of the impact the new system would impose on the workload, the head of the Technical Services Branch at Ft Bliss was also included in the development process. An economic analysis of the present and proposed systems was initiated at TRASANA in November 1980. The concept and study effort were further expanded in February 1981 to include the two DARCOM libraries at White Sands Missile Range - White Sands Missile Range Technical Library and the White Sands Missile Range Morale Support Library.

Using the data from the economic analysis, a "Justification to Acquire Standard ADPE," and a funding request under the Productivity Investment Fund were submitted in April 1981.

Objectives

a. Analyze the functional performance of the alternative library circulation systems.

b. Conduct a comparative analysis of the alternatives.

c. Prepare justification for acquisition approval and funding requests if current system is not selected.

d. Develop a methodology for economic analysis of circulation systems that may be used by library personnel in future studies.

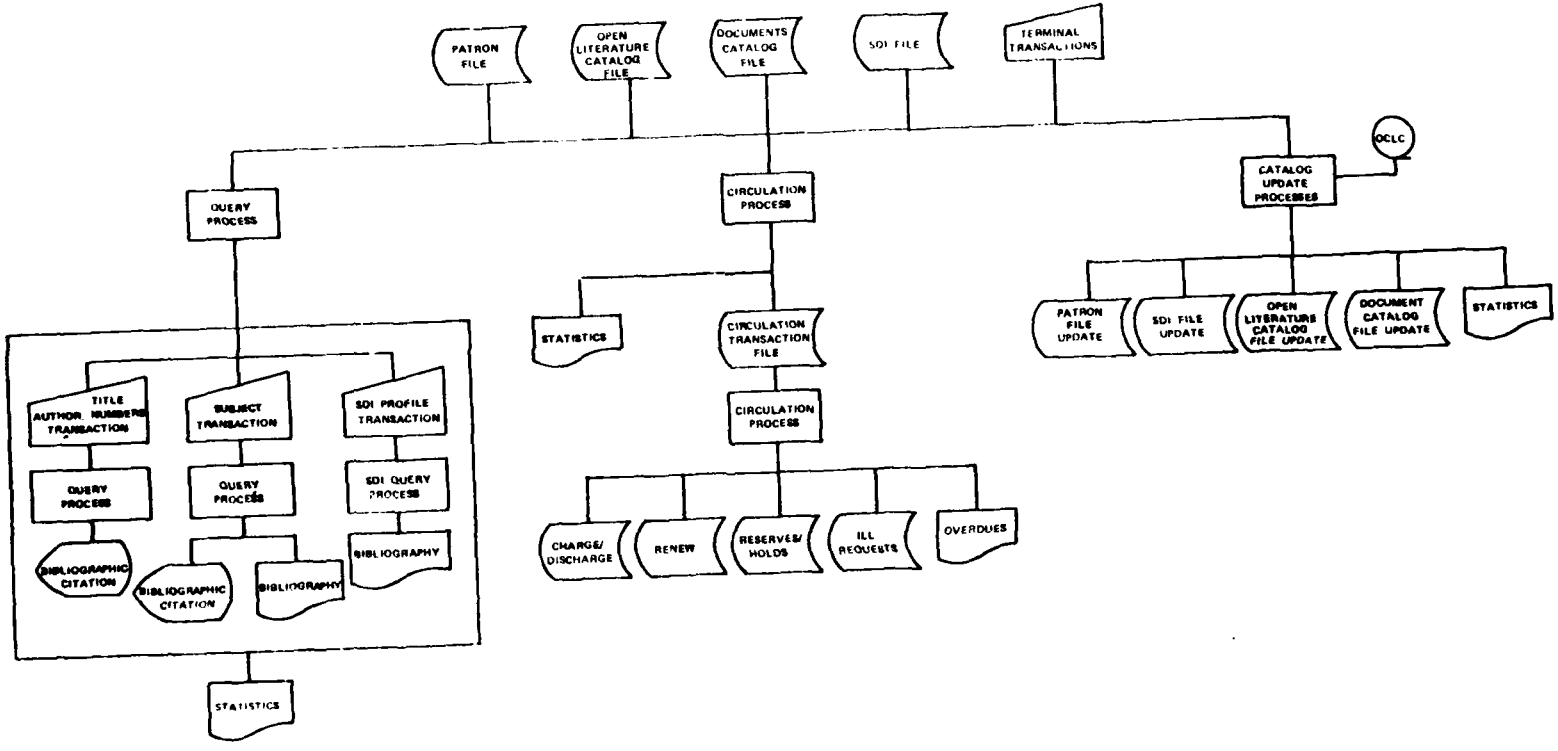


FIGURE 1. AUTOMATED FILES AND PROCESSES

Scope

The scope of this study is limited to three of the major library functions identified in figure 1. All of the functions are discussed as to their effectiveness but because of the funding deadline and lack of data, a cost analysis was performed for only the circulation process. Only those costs which were directly attributable to the circulation process were considered in the methodology. Due to the nature of the distribution of the work in the library, manpower savings identified by application of this methodology to a single functional area would not justify a reduction in manpower requirements.

Using an existing TRADOC main frame computer was eliminated from consideration as a viable alternative for the following reasons:

a. Security requirements for entrance into the TRASANA computer.

b. Size of the data base.

c. Telephone costs to computers located outside the local area.

d. Cost to develop an in-house computer program is greater than the cost of a purchased program.

Alternatives

Two alternatives were considered:

a. Retain present systems

b. Share a stand-alone minicomputer system

The present circulation systems of the six libraries are composed of a variety of manual and batch systems. Four of the libraries utilize the Gaylord Model C Book Charger. Using this machine, a date due and borrower registration number is imprinted on a book card and the date due is stamped on a borrower's card. The book card and borrower's card are maintained on file in the library. The Ft Bliss Morale Support Library uses the BRODAC Circulation System which makes a thermographic copy of the book card, patron card, and transaction card. Two systems are used at the TRASANA Technical Library, a manual two book card system and an automated batch system. The White Sands Missile Range Technical Library uses the Gaylord system as well as a form on which the basic bibliographic information is typed.

The automated system is a fully interactive, off-the-shelf inventory and circulation control system supported by a minicomputer with networking capability for up to 35 dedicated terminals as well as dial-up access by TRALINET and other TRADOC libraries. The minicomputer is composed of a central processing unit and four high density disk units with two back-up magnetic tape drives. Each library will have a minimum of one dedicated Cathode Ray Tube (CRT) terminal with Optical Character Reader (OCR) wand and an associated printer. A portable terminal with a memory (software) will be used to charge and discharge items during off hours or computer down time. The minicomputer will be simple enough to be operated by library personnel with a minimal background in programming and computer operation.

METHODOLOGY

A timing study, one week per month for three months, was conducted within the four TRADOC libraries. The two DARCOM libraries were brought into the project later and thus conducted their timing study for two weeks only. The transactions timed were any that could be automated - charges, discharges, overdues, searches, reserves, clearances, and circulation filing.

Manual Circulation

The data collected during the timing study, along with personnel, supply, and maintenance costs provided by each head librarian, were used to calculate the total manual circulation costs per library. Appendix A contains a detailed breakdown of the cost methodology.

Automated Circulation

The turn-around times for charges, discharges, and clearances were provided by the Boulder Public Library (Colorado) which has had an automated system since October 1979. All other transaction times were estimated by librarians familiar with other automated systems. Based on Boulder accrued costs, supply and maintenance costs of the libraries in this study were calculated. Personnel salary costs, the same as for the manual system, were used with these costs to calculate the total automated circulation costs for each library.

CURRENT SYSTEMS

None of the libraries use the exact same circulation system, but four of the libraries use the Gaylord Model C Book Charger to assist in the circulation process. The four libraries using the Gaylord equipment are: White Sands Missile Range Technical Library, White Sands Missile Range Morale Support Library, Air Defense School Library, and Sergeants Major Academy Learning Resources Center. The White Sands Missile Range Technical Library uses a form manual system as well as the Gaylord system. The BRODAC Circulation System is used by the Ft. Bliss Morale Support Library. An automated batch process and manual book card system are used by the TRASANA Technical Library. Appendix B gives a detailed description of the circulation system for each library.

AUTOMATED SYSTEM

Many automated circulation systems are available on the open market, but none of these systems will fulfill the complete needs of the Ft Bliss/White Sands Automated Circulation System. The flowchart in figure 1 shows the basic files and processes that are needed. Interaction with the files is accomplished either by entering the information via the keyboard or reading the information via an OCR wand. All functions are currently available except those dealing with the Selective Dissemination of Information (SDI) profile transaction. For further information on the SDI Program see page 7.

The patron file consists of information about the patron - name, address, telephone number, library status, type of patron, and SDI subject profile filed under a patron registration number. At the time of registration, the patron is given a card with the patron registration number. Each item in the

collection is assigned a system unique number which is affixed to the item. Two files contain the cataloging information on the items in the collections. The Open Literature Catalog File has the information about items which are available to anyone. The Documents Catalog File accommodates information about technical reports; access to this file is controlled. The SDI File contains indexing information about articles in the periodicals received by the libraries. Information in this file is maintained on-line for three to six months, then placed in off-line storage.

The query process is used to establish the availability or status of an item, items under a specific subject, and composition of a bibliography. All the basic circulation functions of charge and discharge, renewal, reserves, and overdue notices as well as the interlibrary loan requests within the system are handled in the circulation process. These files are updated either through magnetic tape or keyboarding.

In order to check out an item, the patron presents his patron card with the item to the desk attendant. After the charge key has been pushed, the wand is passed over the patron registration number on the patron card, then over the optical character number on the item. The system checks the status of the patron. The item is charged to the patron if a block does not appear in this check. The date due is stamped in the book or a date due slip is placed in the item. To discharge a returned item, the discharge key is pushed and the wand is passed over the optical character number. The computer deletes the charge and places the book in the on-shelf status. Overdue items are automatically identified by the computer and overdue notices are generated upon request.

COMPARATIVE EFFECTIVENESS OF SYSTEMS

Automation in a library significantly enhances library operations and services in the following areas:

a. Eliminates or greatly reduces time-consuming clerical operations

b. Streamlines internal procedures

c. Provides rapid, more complete service to patrons

d. Provides better collection management and development

e. Provides resource sharing among area libraries

f. Provides better utilization of library professional and support staff

Several of these time-consuming, labor-intensive operations which could be eliminated or greatly reduced by an automated system are:

a. Filing book and patron cards

b. Locating misfiled cards

c. Identifying overdue items and typing overdue notices

d. Typing accession lists

e. Identifying and listing checked out items for patrons who are clearing post

The time spent in these operations could be better utilized in the reference/reader's advisory areas and in expanded services to the library patrons.

Several areas where greater effectiveness can be achieved are listed below.

a. Ability of a patron to place a hold on a collection item

b. Verification of the existence of an item in the collection or on-order

c. Determining the location/status of an item in the collection

d. Determining media form and document classification

The Bobst Library at New York University found that "More patrons use the hold procedure because it is easier and yields better results than the old manual system. It is also easier to tell if books are lost or just temporarily missing. . . ."[2]

One advantage of automation is that it provides uninterrupted and stablized services with current staff although new services may be added and old services expanded "because an automated system is capable of absorbing increasing work loads with little loss of efficiency. . . ."[3] The Bobst Library found with its automation program that "although the number of staff hours is approximately the same now as it was before, the staff is handling a higher circulation with far greater output in terms of notices produced and different types of tasks performed than ever before."[4] For many years, libraries have been experiencing a shortage of the manpower required for their mission. The proposed automated system will alleviate this shortage and still allow accomplishment of the mission in the most effective and efficient manner.

John Corbin in his article "Planning and Automation Program" points out, "Automation generally sharpens the focus of the organization of a library into clear-cut and precise terms. In arranging the work into efficient flows

---

[2] *Nelson, Bonnie R., "Implementation of On-Line Circulation at New York University," Journal of Automation, vol. 12 no. 3, Sept 79, p 231.*

[3] *Corbin, John B., "Planning and Automation Program," Proceedings, Second Texas Conference on Library Automation, March 27, 1969, p 58.*

[4] *Nelson, Bonnie R., "Implementation of On-Line Circulation at New York University," Journal of Library Automation, vol. 12 no. 3, Sept 1979, p 231.*

necessary for automation, all wasted motions and overlapping functions are or can be eliminated, thus creating streamlined and well-defined operations."[5]

Resource sharing offers a benefit in the area of cataloging. For those items where duplication is necessary, cataloging needs to be done only once because other area libraries could use the established record, and add only their holdings information. The TRALINET System Office has established that 10 minutes are required for original cataloging with automation and only 4-5 minutes are required to modify an existing record.

Another area where greater effectiveness could be realized is collection development and management. Under the present system, items are purchased for the collection in areas where the librarians project a need. An automated sytem can generate reports that show the specific subject areas where circulation is most active and should, therefore, be increased. These reports show which items in the collection are "dust catchers" and provide the library an intelligent and relatively inexpensive tool for the weeding process.

Finally, one of the advantages of automation, found by the Bobst Library, was that check-out was faster and required no work by the patron. Consequently, the advantages of automation go beyond the turn-around time for a circulation transaction where less time is utilized. Under an automated system the clearance and overdue procedures go from labor intensive tasks to minimal labor tasks since the searching and typing time is replaced by the computer (see appendix B). While automated systems are faster and more accurate, they also allow for a greater range of services to the patron. For example, under a manual system, the compilation of a bibliography is a very intensive and laborious effort that requires the identification of reports, books, etc., in the collection on a specific topic, and then typing a list. With an automated system, a short subject search of the data base would give the patron a complete bibliography which would be printed if necessary. Because of a lack of manpower, most libraries with a manual system do not provide this bibliographic service, but could provide it with an automated system.

Selective Dissemination of Information

One of the services which should be available to library patrons is an SDI program. In an SDI program analysts, researchers, lesson authors, and faculty members establish with the library a subject profile of those areas in which the individual needs to keep current. As periodicals, books, reports, etc. arrive, each is scanned for major subject areas. When articles or chapters are identified which match a profile, the user is notified. A small study conducted among TRASANA analysts, White Sands researchers, and SMA/USAADS lesson authors and faculty members indicates that the library could save each analyst and faculty member an average of 4.8 hours per month. (Further discussion of the results can be found in appendix C.) In the White Sands Missile Range and Ft Bliss Morale Support libraries, the time saved could be expended on increased programming in the areas of education and

---

[5] *Corbin, John B., "Planning and Automation Program," Proceedings, Second Texas Conference on Library Automation, March 27, 1969, p 58.*

recreation (especially for children and special interest groups) and more individualized attention for library patrons.

Collection Duplication

One of the major benefits of the automated circulation system is sharing the collection resources of each library among participating libraries. Since the total collection of each library is in the data base, any library in the network can immediately determine whether the requested item is in the system and is available for check-out, or whether it is on-order. Any bibliographies complied in this system would be much more effective since the holdings of all the libraries would be included.

Another benefit of resource sharing is in the area of duplication. Because any item in the system can be quickly identified and borrowed regardless of the holding library, duplication of books, reports, periodicals, etc., in each library's collection can be minimized. Many books in the area library collections were bought because they might be of interest to the library clientele and their availability in the area was unknown.

In studying the collection duplication between six area libraries, each library contributed 100 titles to a cumulated list which was then checked by each library. The results of this study show the following percentages of duplication and the number of titles duplicated at each library from the cumulated list.

TABLE 1. TITLE DUPLICATION BY LIBRARY

Library	No. of Title Duplications	% Duplication
Sergeants Major Academy Learning Resources Center	114	19.0%
Air Defense School Library	72	12.0%
Ft Bliss Morale Support Library	109	18.2%
TRADOC Systems Analysis Activity Technical Library	13	2.2%
White Sands Missile Range Technical Library	52	8.7%
White Sands Missile Range Morale Support Library	85	14.2%

The total percentage of duplication is 48.8% with 19.2% of the duplicated titles being held by three or more libraries. It should be noted that some duplication will always exist in the reference collection and in the reports, books, periodicals, etc., which are needed on a daily or weekly basis. Nevertheless, with the automated system the unnecessary duplication can be kept to a minimum. For further discussion of this study see appendix C.

Conversion

Conversion of library manual catalogs and indexes into a machine-readable form can be a costly and/or labor intensive effort. It could end up costing the library more to convert its files than to acquire the computer hardware and software combined. The three major methods of conversion are "on-the-fly" or "catch-as-catch-can," in-house, or contracted.

a. Usually, "on-the-fly" conversion is used when the data base created is only used for the circulation function. With this method the item is labeled and temporarily entered by the circulation staff the first time it is used. This temporary record is later finalized by the cataloging staff.

b. In-house conversion utilizes one of the large machine-readable data bases, such as, OCLC, RLIN, Blackwell North American, or borrowing a data base from another library with similar holdings. It may require hiring additional cataloging staff. With this method, a search of the data base by LC card number, ISBN, author, or title is initiated for each book, etc., to be converted. When a compatible record is found, it is completed by the library. Items for which no matches are found are keyboarded from existing catalog cards or title pages.

c. Contracted conversion means the total conversion effort is given to a commercial firm specializing in catalog conversion.

"Patron files for public libraries are commonly created on-the-fly as patrons present themselves for service. Academic and special libraries often have student and/or payroll records available and can create the data base ahead of time. Patron label numbers are always assigned when the patron registers or first circulates material."[6]

In deciding which method or combination of methods to use, the library must consider the following areas:

- Use of the data base being created
- Future automation requirements
- Need for total versus partial conversion
- Size and nature of the collection
- Manpower available
- Cost
- Patron satisfaction

How the library will use the data base may determine the extent of conversion as well as the type of conversion. If the data base is to be used only as a circulation tool, only those items which are used will need to be converted. "On-the-fly" conversion would probably be the most expedient type of conversion. If the library is going to use the data base for circulation along with card catalog replacement, serial check-in, or other type functions, total

conversion may be essential. It cannot be overemphasized that the information being generated in the data base should be correlated with future improvements the library might want to make. If allowances are not made for these future needs, the data base may have to be reconverted in the future. Libraries with a large collection may not be able to afford total conversion no matter what method is used. Small libraries may totally convert their collection easily if the manpower and/or funds are available. In choosing the method(s) for conversion, the type of material in the collection must be kept in mind. Where collections are highly specialized, in-house conversion may not be very effective since a low hit rate for material may be encountered when an established system is used for conversion.

Available manpower and cost may or may not be an important factor in deciding what conversion method the library will use. If money is readily available and manpower is scarce, contracted conversion is the best method. Current market costs are running $2.00 to $5.00 per record and only minimal manpower is needed for monitoring the contract and the quality of the output. With plentiful manpower but scarcity of money, "on-the-fly" conversion would be the best method. Scarcity of both manpower and funds will lead to using a combination of one or more of the conversion methods.

Lastly, the impact of the conversion on the patron is of prime importance in choosing a method. If a method will cause long delays and/or hassles for a portion of its clientele, the library should consider another method. It must be remembered that a library could have the best system in the world, but if it alienates its patrons during the conversion process, it may not have any patrons left to use it.

TRADOC Libraries Conversion

Conversion of the TRASANA Technical Library records will be a minor problem. The open literature portion of the collection is already in MARC format and available on OCLC archival tapes. The documents portion of the collection is in machine-readable format in the TLIB data base. The TLIB data base will need to be converted to a modified MARC format before being loaded into the minicomputer. Conversion of TLIB is estimated at 1.5 man-months and approximately $1200.00. The only other manpower requirements for conversion would be the input of the patron file in the collection, addition of OCR labels to each item except the periodicals, and keying that number to the appropriate computer record. It is estimated that this portion of the conversion will require 3.5 man-months and $2600.00.

Document records at the Air Defense School Library are in the process of being added to the TRASANA TLIB data base. Therefore, their conversion will be concomitant with the TRASANA Technical library conversion. An estimated 4.25 man-months and $5000.00 will be required to key the OCR labels to the appropriate computer record.

---

[6] *Boss, Richard W., "Circulation Systems: the Options", Library Technology Reports, Vol. 15 no. 1, Jan - Feb 1979, p 88.*

Conversion of the manual catalogs of the Air Defense School Library, Ft Bliss Moral Support Library and Sergeants Major Academy Learning Resources Center will be conducted in three phases using a combination of the "on-the-fly" and in-house conversion methods. In the beginning of FY82 all three libraries will begin entering their new acquisitions into the OCLC system via the TRALINET cataloging center. Not later than the third quarter of FY82 these libraries will also input records for books, and other items which are checked out of the library. When funds become available in FY83, two GS-11 catalogers and one GS-04 library technician will be hired for one year to handle the major conversion effort. The catalogers will be located at the TRALINET cataloging center and the library technician will be shared by the three Ft Bliss libraries. The two catalogers will be able to convert approximately 32,000 of the 96,479 titles to be converted. By the end of FY83 approximately one-third of the most-used titles should have been converted at a cost of $19,800.00. If funds are available, the conversion project will be continued in FY84; otherwise, the remaining titles will be converted as library and TRALINET staff time is available. Total conversion is not expected to be completed before the end of FY86 at the earliest. The following table lists the expected costs for conversion of the TRADOC libraries.

TABLE 2. CONVERSION COSTS (TRADOC)

96,479 records x $0.60 per record	$ 57,887.00
Two catalogers @ $25,486.00 each	$ 50,972.00
TRALINET personnel @ $25,486/yr x 4 yrs	$101,944.00
One library technician $12,423.00	$ 12,423.00
Library staff time	$ 7,600.00
TLIB conversion	$ 1,200.00
OCR labels @ $14.00/1000 x 160,000 labels	$ 2,240.00
Total	$234,266.00

DARCOM Libraries Conversion

Both the White Sands Missile Range Technical Library and the White Sands Missile Range Morale Support Library will be using the "on-the-fly" conversion method. The White Sands Missile Range Technical Library expects to become a participant in OCLC in FY82 (funds permitting). Conversion of the White Sands Missile Range Technical Library is expected to take 5.3 man-years and the White Sands Missile Range Morale Support Library expects to expend 1.6 man-years in conversion. Listed below are the expected costs for conversion of the DARCOM libraries.

TABLE 3. CONVERSION COSTS (DARCOM)

98,000 records x $0.60 per record	= $ 58,800.00
30,000 records x $0.05 per record	= $ 1,500.00
Library staff time (Tech Lib)	= $ 99,400.00
Library staff time (Morale Support Lib)	= $ 27,200.00
OCR labels @ $14.00/1000 x 120,000 labels	= $ 1,680.00
Total	= $188,580.00

Total cost for the conversion of the TRADOC and DARCOM libraries is estimated at $422,846.00.

COMPARATIVE COST OF SYSTEMS

Table 4 compares the annual operating costs and manpower requirements for each library in the network. The automated mode is less costly than the manual mode by $19,853.55 and would save 3.22 manyears per year. More detailed data is available in appendix B.

TABLE 4. ONE-YEAR SAVINGS - MANUAL VERSUS AUTOMATED
(FY81 Dollars)

Library	Manual($)	Automated($)	Difference $	Manual (man-year)	Automated (man-year)	Difference (man-year)
SMA Learning Resources Center	$ 4,819.95	$6,872.01	$ 2,052.06	0.30	0.03	-0.27
TRASANA Technical Library	12,168.34	6,952.53	-5,215.81	0.42	0.03	-0.39
Ft Bliss Morale Support Library	9,029.80	9,537.26	507.46	0.59	0.22	-0.37
WSMR Technical Library	12,591.78	8,852.89	-3,738.89	0.59	0.10	-0.49
WSMR Morale Support Library	12,796.08	8,736.23	-4,059.85	0.94	0.16	-0.78
USAADS Library	17,515.89	8,117.37	-9,398.52	1.04	0.12	-0.92
TOTAL			-$19,853.55			-3.22

UNCERTAINTIES

SDI Program

Due to time constraints, the SDI Program questionnaire was not as detailed as may be necessary; therefore, the assumptions made regarding the time saved have a degree of uncertainty.

Methodology

Some problem areas encountered in the data collection are:

a. Timing period not long enough

b. Timing over a major holiday period

c. SMA involved in change over of classes

d. Two libraries brought in late in the study period; therefore, timing period short and compressed.

PREPARATION OF CONCEPT PAPER AND JUSTIFICATION

The concept paper is the basis for all actions taken through the procurement of the system; consequently, its preparation is very important. A committee composed of at least one individual from each of the library areas which will be affected and led by an individual knowledgeable in computer applications should be formed. Active participation and support by each affected area are essential if the system is to succeed.

The concept paper should address four areas:

- Purpose of the system
- Basic requirements of the system
- Participating libraries and their locations (if more than one library is involved)
- Establishment of a project milestone schedule

The purpose of the system will include those areas where greater effectiveness or efficiency will occur or new services will be added. The basic system requirements detail the functions and operations the system must perform. A delineation of the basic steps necessary to complete the project of acquisition of the system with timeframes for the accomplishment of each step is the project milestone schedule. An example of a concept paper is shown in appendix D.

Justification

Any purchase of ADPE must be approved by either the headquarters of the major command or Headquarters, Department of the Army, depending on the dollar value. AR 18-1, "Policies, Objectives, Procedures, and Responsiblities," is the governing authority for the preparation of the approval request. Unless a specific system is required, appendix J, "Standard ADPE Justification Format," is used. It is very important that the preparer of the justification work closely with all involved Army Automation Offices.

Within the justification, section II, "Systems Information," should contain the following:

- General background of the project
- Inadequacies of the present system
- Mission or workload constraints
- Requirements of the proposed system

The requirements detailed in the concept paper should be analyzed and further refined. The library should begin categorizing the requirements, adding more detail where necessary, and defining which functions are vital, which are necessary, and which are nice to have. This is the next step toward the system specifications.

A detailed justification forms the body of section III, "Cost Information." The information in this section is the quantification of the purposes stated in the concept paper and dollar savings with the proposed system. The dollar savings can be determined using the methodology in appendix A. An ADPE Lease Versus Purchase Analysis will also be prepared following the example and using the formulas in AR 18-1, appendix L, "ADPE Lease Versus Purchase Analysis."

FINDINGS

- The circulation process annual operating costs of the proposed library network in the automated mode are less costly than in the manual mode by $19,853.55 (table 4).
- Use of the automated circulation system would save the library network 3.22 man-years per year.
- The automated system is more effective than the manual systems in that the library personnel will be allowed more time to perform their professional duties especially in the reference area.
- The SDI Program is a valid mission requirement.
- Through the use of an automated circulation system, collection duplication in future purchases would be decreased by a minimum of twenty percent.
- The resource sharing capability of the automated system provides a more efficient local access to needed materials outside an individual library's collection.
- The methodology in appendix A is a viable method for calculating the operating costs of library circulation systems.
- Conversion costs are estimated at $422,846.00.

RECOMMENDATIONS

- Purchase of an automated circulation system with the capabilities stated on page 5, Automated System and delineated in appendix E, be accomplished.

- Conversion be completed by the in-house method.
- The methodology in appendix A be used as a tool for analysis of library methods in future studies by TRADOC libraries.
- That one week per month for six months be the timing period used in future studies.

APPENDIX A

METHODOLOGY

PURPOSE

This appendix describes in detail the cost methodology for both the manual and automated systems for library circulation.

MANUAL CIRCULATION

In order to obtain data on manual circulation, a timing study wherein each specific operation is timed by a stopwatch is required. Each operation or circulation transaction such as charges, discharges, overdues, which can be replaced or enhanced by the new system must be identified (figure A-1). The timing period is composed of a minimum of one week per month for three months but not more than nine months, and the same week within each month is used. During the specified week, each person performing any or all of the circulation transactions will note on the daily record sheet (figure A-1) the number of items that are processed and the time (clocked by stopwatch) required for the process. A new worksheet is filled out each day by each person.

At the beginning of each timing week, one or two stopwatches, depending on anticipated workload, and the labeled worksheets are made convenient to the circulation desk. The stopwatch is started when the patron hands the book to the librarian or the librarian begins an operation, such as identifying the overdue items. As soon as the transaction is completed, the number of items is noted in the first column and the time is noted in the second column by minute colon seconds (figure A-2). The required information should be written immediately. The stopwatch should always be brought back to zero at the end of each transaction except when an interruption occurs. If interrupted, stop the watch, then resume timing afterward.

Before this data can be processed three types of information are needed:

- Yearly salary of each person performing operations
- Number of actual yearly transactions
- Supply and maintenance costs ("Other Costs" in formula 8)

The average amount of time per transaction used by each person or daily average per transaction per person may be calculated daily (figure A-3) and noted on the daily average record sheet (figure A-4). Formula 1 is used to calculate this daily average.

WARNINGS:

- *Each of the formulas except formula 5 is calculated for each type of transaction.*

° *Formulas 1, 2, 4, 5, and 6 must be calculated for each participating individual as well as for each type of transaction.*

° *Rounding to only two decimal places during the calculation may create a significant error in the final cost results. This error is especially noticeable when supply and maintenance costs are low and the number of transactions is high.*

NAME _____ DATE _____

CHARGING						DISCHARGING				OVERDUES			
# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME

OTHER TRANSACTIONS

SEARCHES/RESERVES										
CLEARANCES										
CIRC FILING										

FIGURE A-1. DAILY RECORD SHEET

NAME _____ DATE _____

CHARGING						DISCHARGING				OVERDUES			
# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME
9	10:12					1	0:22			15	12:16		
3	3:01					10	14:22			3	3:07		
1	0:56					4	3:06			3	3:25		
1	1:50									4	3:30		
6	3:32												
7	3:00												

OTHER TRANSACTIONS

SEARCHES/RESERVES	1/7:42	2/10:31										
CLEARANCES	1/3:10											
CIRC/FILING	10/8:52											

FIGURE A-2. EXAMPLE OF DAILY RECORD SHEET WITH DATA

NAME _____ DATE _____

CHARGING						DISCHARGING				OVERDUES			
# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME	# DOC	TIME
9	10:12		*10.20*			1	0:22		*0.37*	15	12:16		*12.27*
3	3:01		*3.02*			10	14:22		*14.37*	3	3:07		*3.12*
1	0:56		*0.93*			4	3:06		*3.10*	3	3:25		*3.42*
1	1:50		*1.83*							4	3:30		*3.50*
6	3:32		*3.53*										
7	3:00		*3.00*										
(b)			*(a)*			*(b)*			*(a)*	*(b)*			*(a)*
27	*doc*		*22:51*			*15*	*doc*		*17.84*	*25*	*doc*		*22.31*
		(c)						*(c)*				*(c)*	
	Aver	*0:83*	*min*				*Aver*	*1.19*	*min*		*Aver*	*0.89*	*min*

OTHER TRANSACTIONS

					(b)	*(a)* Time		*(c)*
SEARCHES/RESERVES	1/ 7:42	2/ 10:31			*3 doc*	*18.22*	*Aver*	*6.07min*
CLEARANCES	1/ 3:10				*1 doc*	*3.17*	*Aver*	*3.17min*
CIRC/FILING	10/ 8:52				*10 doc*	*8.87*	*Aver*	*0.89min*

FIGURE A-3. DAILY RECORD SHEET WITH DATA AND AVERAGES

NAME: _____ WEEK OF: _____

	DAILY AVERAGE						
	SUN	MON	TUE	WED	THU	FRI	SAT
CHARGING							
DISCHARGING							
OVERDUES							
SEARCHES/RESERVES							
CLEARANCES							
CIRCULATION/FILING							
VERIFY CARDS*							
ERROR LIST*							
FILE FORMS 61s*							

FIGURE A-4. DAILY AVERAGE RECORD SHEET

*May or may not be used.

FORMULA 1 - Average Minutes/Transaction/Person/Day (Figure A-3)

$$a \div b = c$$

a = total amount of time expended each day by each person on each type of transaction.

b = total number of items processed each day by each person by type of transaction.

c = average minute/each type of transaction/person/day

Step 1 - convert each time from minutes and seconds into minutes:

minutes + (seconds ÷ 60) = minutes

Example: 10:12 (10 minutes 12 seconds)

10 + (12 ÷ 60) = 10 + 0.20 = 10.20

Step 2 - total the converted time column(s) = a

Step 3 - total the # Doc column(s) = b

Step 4 - calculate "c" using Formula 1

Example:

Charges: (1 person for 1 day)

a ÷ b = c *a = 17.84; b = 27 (figure A-3)*
22.51 ÷ 27 = c
0.83 = c

Discharges: (1 person for 1 day)

a ÷ b = c *a = 17.84; b = 15 (figure A-3)*
17.84 ÷ 15 = c
1.19 = c

These averages are to be calculated for each person for each type of transaction for each day of the timing study and noted on the Daily Average Record Sheet(s) for that individual (see figure A-4).

FORMULA 2 - Average Minutes/Transaction/Person

$$(c_1 + \ldots + c_n)^* \div d = e$$

c = average minutes/each type of transaction/person/day (noted on the Daily Average Record Sheet, and calculated from Formula 1).

d = number of daily averages (number of "cs" in parentheses)

e = average minutes/each type of transaction/person

Example:

Charges

Person 1	Person 2
$(c_1 + \ldots + c_n) \div d = e$	$(c_1 + \ldots + c_n) \div d = e$
$(0.83 + 1.40 + 0.98 + 1.22) \div 4 = e$	$(0.82 + 2.03 + 1.72) \div 3 = e$
$4.43 \div 4 = e$	$4.57 \div 3 = e$
$1.11 = e$	$1.52 = e$

Overdues

Person 1	Person 2
$(c_1 + \ldots + c_n) \div d = e$	$(c_1 + \ldots + c_n) \div d = e$
$(0.89 + 1.17) \div 2 = e$	$(1.46 + 1.29 + 0.83) \div 3 = e$
$2.06 \div 2 = e$	$3.57 \div 3 = e$
$1.03 = e$	$1.19 = e$

**The three dots represent all other "cs" calculated for that transaction using formula 1.*

FORMULA 3 - Overall Average Minutes/Transaction/Library

$$(e_1 + \ldots + e_n)^* \div f = g$$

e = average minutes/each type of transaction/person (Formula 2)

f = total number of individuals who submitted a Daily Record Sheet

g = average minutes/each type of transaction/library

Example:

Charges

$$(e_1 + \ldots + e_n) \div f = g$$
$$(1.11 + 1.52) \div 2 = g$$
$$2.63 \div 2 = g$$
$$1.32 = g$$

Overdues

$$(e_1 + \ldots + e_n) \div f = g$$
$$(1.03 + 1.19) \div 2 = g$$
$$2.22 \div 2 = g$$
$$1.11 = g$$

The resulting value of g derived from Formula 3 is the first column of figure A-5, Circulation Costs (page A-16).

---

*All calculated "e" values for each person in the library are added together here.

FORMULA 4 - Cost/Minute/Person*

$$(h \div 2080\ hrs) \div 60\ minutes = i$$

h = yearly salary

2080 = number of working hours/year

60 = number of minutes/hour

i = cost/minute/person

Example:

	Grade	Yearly Salary (h)
Person 1	GS11/02	$23,236.00
Person 2	GS05/01	12,266.00

Person 1

$$(h \div 2080) \div 60 = i$$
$$(23{,}236 \div 2080) \div 60 = i$$
$$11.17 \div 60 = i$$
$$\$0.19 = i$$

Person 2

$$(h \div 2080) \div 60 = i$$
$$(12{,}266 \div 2080) \div 60 = i$$
$$5.90 \div 60 = i$$
$$\$0.10 = i$$

---

*This cost can be derived as soon as the yearly salaries are available.

FORMULA 5 - Transaction Cost/Person

$$e \times i = j$$

e = average minutes/each type of transaction/person (Formula 2)

i = cost/minute/person (Formula 5)

j = transaction cost (each type)/person

Example:

Charges

Person 1	Person 2
$e \times i = j$	$e \times i = j$
$1.11 \times \$0.19 = j$	$1.52 \times \$0.10 = j$
$\$0.2109 = j$	$\$0.1520 = j$

Overdues

Person 1	Person 2
$e \times i = j$	$e \times i = j$
$1.03 \times \$0.19 = j$	$1.19 \times \$0.10 = j$
$\$0.1957 = j$	$\$0.1190 = j$

FORMULA 6 - Cost/Person/Total Transactions

$$j \times k = l$$

j = transaction cost (each type)/person (Formula 5)

k = total number of each type of transaction performed by each person throughout the study

l = cost/person/total transactions

Example:

Given:

	Charges	Overdues
Person 1	291(k_1)	89(k_3)
Person 2	186(k_2)	209(k_4)
TOTAL	477	298

Charges

Person 1	Person 2
$j \times k = l$	$j \times k = l$
$\$0.2109 \times 291 = l$	$\$0.1520 \times 186 = l$
$\$61.3719 = l$	$\$28.2720 = l$

Overdues

Person 1	Person 2
$j \times k = l$	$j \times k = l$
$\$0.1957 \times 89 = l$	$\$0.1190 \times 209 = l$
$\$16.5273 = l$	$\$24.871 = l$

FORMULA 7 - Total Personnel Costs/Transaction

$$(l_1 + \ldots + l_n) \div m = n$$

l = cost/person/total transactions (Formula 6)

m = total number of each type of transaction completed by each library throughout the study

n = total personnel cost/transaction

Example:

Given: Charges 477(m_1)
Overdues 298(m_2)

Charges

$$(l_1 + \ldots + l_n) \div m = n$$
$$(\$61.3719 + \$28.2720) \div 477 = n$$
$$\$89.6439 \div 477 = n$$
$$\$0.19 = n$$

Overdues

$$(l_1 + \ldots + l_n) \div m = n$$
$$(\$16.5273 + \$24.871) \div 298 = n$$
$$\$41.3983 \div 298 = n$$
$$\$0.14 = n$$

FORMULA 8 - Other Costs*/Transaction (Charges and Discharges only)

$$1/2\ p \div q = r$$

p = other costs/year

q = number of transactions of one type/year**

r = other costs/transaction (charges and discharges only)

Step 1 - compute q by:

$$\frac{m \text{ (formula 7) } x \text{ 52 weeks}}{\text{\# of timed weeks in study}} = q$$

Step 2 - compute r using Formula 8

Example:

Given:

Supply & Maintenance = $ 2,942 (p)

Yearly transactions:

Charges	12,881 (q_1)
Overdues	12,000 (q_2)

Charges

$$1/2\ p \div q = r$$
$$1/2\ (2,942) \div 12,881 = r$$
$$1,471 \div 12,881 = r$$
$$\$0.11 = r$$

NOTE: Other half of costs for discharges in actual study.

Overdues

Not applicable since supply and maintenance costs were calculated for charges and discharges only.

**Supply and maintenance costs are divided equally among charges and discharges because these are the main areas where costs are incurred in a manual system. Maintenance costs may include costs for the system and/or facilities, e.g., utilities, rent, etc.*

***q may be compared with the number of actual yearly transactions to check the calculated data for validity.*

FORMULA 9 - Total Cost/Transaction

$$n + r = s$$

n = total personnel costs/each type of transaction (Formula 7)

r = other costs/each type of transaction (Formula 8)*

s = total cost/each type of transaction

Example:

Charges

$$n + r = s$$
$$\$0.19 + \$0.11 = s$$
$$\$0.30 = s$$

Overdues

$$n + r = s$$
$$\$0.14 + \$0 = s$$
$$\$0.14 = s$$

Using this methodology, only charges and discharges will have a "r" value.

An easy format for presentation of the costs and times derived is shown below. It can be used for all types of circulation systems. The data are calculated in the manner listed below the chart:

_____ CIRCULATION COSTS

Xact*	Min/Xact (avg) g	Costs/ Xact (avg) s	Xact/ Yr q	Personnel Cost/Yr $n \times q$	Other Cost/Yr $r \times q$	Cost/ Yr $s \times q$	Mhr/Yr $(g \times q) \div 60$
Charges							
Discharges							
Overdues							
TOTAL							

FIGURE A-5. EXAMPLE OF CIRCULATION COSTS FORMAT

Avg Min/Xact = g (Formula 3)
Avg Costs/Xact = s (Formula 9)
Xact/Year = q (Formula 8)
Cost/Year = $s \times q$ (Formulas 8 & 9)
Personnel Cost/Year = $n \times q$ (Formulas 7 & 8)
Other Costs/Year = $r \times q$ (Formula 8)**
Man-hours/Year = $(g \times q) \div 60$ (Formulas 3 & 8)

Xact = transactions

***Only applies to charges and discharges.*

Example:

MANUAL CIRCULATION COSTS

Xact	Min/Xact (avg) *g*	Costs/ Xact *e*	Xact/ Yr *q*	Pers Cost/Yr *n x q*	Other Cost/Yr *r x q*	Cost/Yr *e x q*	Mhr/Yr *(g x q) ÷ 60*
Charges	1.32	$0.30	12,881	$2,447.39	$1,416.91	$3,864.30	283
Overdues	1.11	0.14	12,000	1,680.00	NA	1,680.00	222
TOTAL				$4,127.39	$1,416.91	$5,544.30	505

AUTOMATED CIRCULATION

The data required for the automated circulation system are taken from the manual circulation data just calculated and other automated systems.

The transaction turn-around time will remain constant for the automated system in any library. These times with their appropriate transactions are:

° 6 seconds (0.10 minutes) for charges, discharges, and clearances (based on experience of a library with an automated system)

° 25 seconds (0.42 minutes) for overdues (based on an on-line system for printing one screen of information)

° 60 seconds (1.00 minutes) for searches and reserves (based on the experience of several librarians who work with automated search services). These times are the "e" equivalent for the automated system in Formula 5 (page A-19) and the "g" equivalent in the final cost table.

Supply and maintenance costs, obtained from a library with an automated system, were recalculated to meet the needs of the libraries in this study. However, supply and maintenance costs will vary depending on the type of automated system and the needs of the individual library. Some supply costs to be considered are computer paper, OCR or bar code labels, and forms for overdue notices. As in the manual system, these costs may be divided between charges and discharges (Formula 8a in this study), or divided among all the transactions on a percentage basis since all transactions will incur supply and maintenance costs in the automated system (formula 8b). Although formulas 1-6 are not recalculated, some of the manual system data will be used in subsequent formulas for the automated system.

Personnel salary costs, the same as for the manual system, were used to calculate the total automated circulation costs for each library. Therefore, the automated cost per minute per person will be the same a "i" in Formula 4, page A-10.

FORMULA 5 - Transaction Cost/Person

$$e \times i = j$$

e = average minutes/each type of transaction/person (p A-18)

i = cost/minute/person (Formula 5)

j = transaction cost (each type)/person

Example:

Charges

Person 1	Person 2
$e \times i = j$	$e \times i = j$
$0.10 \times \$0.19 = j$	$0.10 \times \$0.10 = j$
$\$0.019 = j$	$\$0.01 = j$

Overdues

Person 1	Person 2
$e \times i = j$	$e \times i = j$
$0.42 \times \$0.19 = j$	$0.42 \times \$0.10 = j$
$\$0.0798 = j$	$\$0.042 = j$

FORMULA 6 - Cost/Person/Total Transactions

$$j \times k = l$$

j = transaction cost (each type)/person (Formula 5)

k = total number of each type of transaction performed by each person throughout the study

l = cost/person/total transactions

Example:

Given:

	Charges	Overdues
Person 1	291(k_1)	89(k_3)
Person 2	186(k_2)	209(k_4)
TOTAL	477	298

Charges

Person 1	Person 2
$j \times k = l$	$j \times k = l$
$\$0.019 \times 291 = l$	$\$0.01 \times 186 = l$
$\$5.529 = l$	$\$1.86 = l$

Overdues

$j \times k = l$	$j \times k = l$
$\$0.0798 \times 89 = l$	$\$0.042 \times 209 = l$
$\$7.1022 = l$	$\$8.778 = l$

FORMULA 7 - Total Personnel Cost/Transaction

$$(l_1 + \ldots + l_n) \div m = n$$

l = cost/person/total transactions (Formula 6)

m = total number of each type of transaction by each library throughout the study

n = total personnel cost/transaction

Example:

Given: Charges 477(m_1)
Overdues 298(m_2)

Charges

$$(l_1 + \ldots + l_n) \div m = n$$
$$(\$5.529 + \$1.86) \div 477 = n$$
$$\$7.389 \div 477 = n$$
$$\$0.02 = n$$

Overdues

$$(l_1 + \ldots + l_n) \div m = n$$
$$(\$7.1022 + \$8.778) \div 298 = n$$
$$\$15.8802 \div 298 = n$$
$$\$0.05 = n$$

FORMULA 8a - Other Costs*/Transaction
(Charges and Discharges only)

$$1/2\ p \div q = r$$

p = other costs/year

q = number of transactions of one type/year**

r = other costs/transaction

Example:

Given: Other costs = $ 6,496 (p)
Yearly transactions:
Charges 12,881 (q_1)
Overdues 12,000 (q_2)

Charges:

$$1/2\ p \div q = r$$
$$1/2\ (6496) \div 12{,}881 = r$$
$$3{,}248 \div 12{,}881 = r$$
$$\$0.25 = r$$

Overdues:

Not applicable since supply and maintenance costs were calculated for charges and discharges only.

---

*Supply and maintenance costs were divided equally among charges and discharges because these are the main areas where costs are incurred in a manual system. Maintenance costs include costs for the system and may include facilities, e.g., utilites, rent, etc.

**Use the same number as calculated for the manual system (q in Formula 8, page A-14).

FORMULA 8b - Other Costs*/Transaction
(All types of transactions)

$$(t \times p) \div q = r$$

t = percent of total transactions of one type to total of ALL transactions**

p = other costs/year

q = number of transactions of one type/year

r = other costs/transaction

Step 1 - t is computed by inserting the data from the first column in the table below into the following formula.

$$t = \frac{\textit{total number of one type of transaction}}{\textit{total number of ALL transactions}}$$

Example:

TABLE 1

	Number (q)	%/TOTAL (t)
Charges	12,881	32
Discharges	9,786	24
Overdues	12,000	30
Searches/Reserves	4,962	12
Clearances	629	2
Circ Filing	(Not used in automated system)	
TOTAL	40,258	100%

**Supply and maintenance costs are divided among all the types of transactions. Maintenance costs are costs for the system and may include facilities, e.g., utilities, rent, etc.*

***When percents are used in mathematical formulas, they must be converted to decimal numbers by dividing the percent by 100.*

Charges:

$$t = \frac{12,881}{40,258}$$

$$t = 0.32 \text{ or } 32\%$$

Overdues:

$$t = \frac{12,000}{40,258}$$

$$t = 0.30 \text{ or } 30\%$$

Step 2 - compute r using formula 8b

Example:

Given: Other costs = \$6,496 (p)
Yearly transactions - see Table 1 on previous page

Charges:

$$(t \times p) \div q = r$$
$$(0.32 \times 6,496) \div 12,881 = r$$
$$2078.72 \div 12,881 = r$$
$$\$0.16 = r$$

Overdues:

$$(t \times p) \div q = r$$
$$(0.30 \times 6,496) \div 12,000 = r$$
$$1,948.80 \div 12,000 = r$$
$$\$0.16 = r$$

Clearances:

$$(t \times p) \div q = r$$
$$(0.02 \times 6,496) \div 629 = r$$
$$129.92 \div 629 = r$$
$$\$0.21 = r$$

FORMULA 9 - Total Cost/Transaction

$$n + r = s$$

n = total personnel cost/each type of transaction (Formula 7)

r = other costs/transaction (Formula 8a or 8b)

s = total cost/each type of transaction

Example: r is from Formula 8b

Charges:

$$\begin{aligned} n + r &= s \\ \$0.02 + \$0.16 &= s \\ \$0.18 &= s \end{aligned}$$

Overdues:

$$\begin{aligned} n + r &= s \\ \$0.05 + \$0.16 &= s \\ \$0.21 &= s \end{aligned}$$

An easy format for the costs and times derived is shown below. The format is the same as figure A-5. The data are calculated in the manner listed below.

Avg Min/Xact = g (Page A-18 of text)
Avg Cost/Xact = s (Formula 9)
Xact/Year = q (Formula 8a or 8b)
Cost/Year = $s \times q$ (Formulas 8a or 8b & 9)
Personnel Cost/Year = $n \times q$ (Formulas 7 & 8a or 8b)
Other Costs/Year = $r \times q$ (Formula 8a or 8b)
Man-hours/Year = $(g \times q) \div 60$ (Page A-18 of text and Formula 8a or 8b)

Example:

AUTOMATED CIRCULATION COSTS

Xact	Min/Xact (avg) g	Costs/ Xact s	Xact/ Yr q	Pers Cost/Yr $n \times q$	Other Cost/Yr $r \times q$	Cost/Yr $s \times q$	Mhr/Yr $(g \times q) \div 60$
Charges	0.10	$0.18	12,881	$257.62	$2,060.96	$2,318.58	21.5
Overdues	0.42	0.21	12,000	600.00	1,920.00	2,520.00	84.0
TOTAL				$857.62	$3,980.96	$4,838.58	105.5

APPENDIX B

DETAILED SYSTEMS DESCRIPTION AND DATA

Current Systems Descriptions

TRASANA Technical Library

The TRASANA Technical Library uses two forms of circulation systems. The classified documents, books, periodicals, maps, and AG publications are checked out via a manual card system. The unclassified documents utilize a batch process automated system.

For the manual system a book card is retained in the book, and a second card is filed at the circulation desk. When a patron checks out a book, the card is pulled from the book for signature and the date due is stamped on the book card and book pocket. The second book card is pulled from the On-Shelf File and posted with the date due and patron name. The patron's card is pulled and posted with the call number of the item. One book card is filed by date due and the other by call number. To discharge the book the process is reversed.

When a patron borrows an unclassified document, TRASANA Form 59 is annotated with the transaction code, index number, copy number, last name and first initial of borrower, date signed out, and date due. The patron signs TRASANA Form 59 and the document is stamped with the date due. Once a week TRASANA Form 59s are keypunched; once a month these keypunched cards are input to the computer. The library is furnished computer printouts by patron name and index number as well as overdue notices and punch cards for all new circulations. To discharge a document the appropriate punch card is pulled from the circulation file and the transaction code is added.

White Sands Missile Range Technical Library

The White Sands Missile Range Technical Library maintains two different circulation systems. The Open Literature Section uses the Gaylord Book Charger system. The Documents Section uses a manual system.

In the Open Literature Section, when a book is presented for circulation, the borrower's card is pulled from the borrower's file located in the circulation desk. The borrower's card is placed in the book charger and the book card, taken from the book pocket, is placed in the machine and stamped. A date due card is stamped by the machine with the borrower number, then placed in the book pocket. The borrower's card is then stamped with the date due. The book card is filed by date due and the borrower's card is refiled. To discharge the book or periodical, the process is reversed.

In the Documents Section, STEWS-AD-L-Form 22 (Classified Documents Circulation Record) is completed in duplicate for each patron. For each document to be checked out, the library staff types unclassified title, report number, copy number, control number and category, and security classification. The date due is stamped beside each entry and the patron signs alongside each entry. The original of STEWS-AD-L-Form 22 is filed by patron name at the circulation desk. The duplicate is given to the patron. A document locator card

duplicates the information from STEWS-AD-L-Form 22, and is filed by date due in the circulation file. When the document is returned, the return date is stamped beside the entry on STEWS-AD-L-Form 22 and the staff member receiving the document signs beside the return date on both copies of the form. The document locator card is pulled and placed in the document.

White Sands Missile Range Morale Support Library

The WSMR Morale Support Library uses the Gaylord Model C Book Charger in the circulation system. When the borrower presents the book or library material at the circulation desk, the borrower's card is pulled from the borrower's card file located at the circulation desk. The borrower's card is then inserted in a slot in the charging machine. The book card is removed from the book and inserted in a similiar slot which activates the machine to stamp the borrower number and the date due on the book card.

A prestamped date due card is placed in the book pocket. The borrower's card is hand stamped with a date due and the number of borrowed library materials is written beside the date due. The book card is filed in the daily circulation file and the borrower's card is returned to the borrower's card file.

To process returned materials, the book card is withdrawn from the circulation desk file, placed in the matching book pocket, and the book is placed on the book truck for reshelving.

Sergeants Major Academy Learning Resources Center

The Learning Resources Center uses the Gaylord Model C Book Charger in the circulation of print and nonprint materials. In the circulation process, the staff refers first to the Borrower's Registration Card File which is arranged alphabetically by patron last name, and notes the number of the individual borrower's card. That numbered card is then pulled from the Borrower's Card File and inserted in the book charge unit. The book card is removed from the pocket of the item being charged out and inserted into the charge unit which stamps simultaneously the date due and borrower number on the book card. A date due card is inserted into the charge unit and also stamped with the date due and borrower number. Staff places the date due card in the pocket of the item being charged and files the book card in the circulation file. This process is reversed for discharge of material.

Ft. Bliss Morale Support Library

The BRODAC Circulation System equipment is used by the Ft Bliss Morale Support Library. With this system, the book card, removed from the book, is placed face down in the machine beside the patron card and a serially numbered and dated transaction card. The appropriate category button - fiction, nonfiction, record - is pressed. A thermographic copy of these cards is reproduced, cut, and automatically stacked for periodic filing by transaction number. The transaction card and book card are then placed in the book pocket. When a book is returned, the transaction card is pulled and filed in numerical sequence by date. These cards are used to delete the thermographic copy of the transaction from the files.

Air Defense School Library

The Air Defense School Library uses the Gaylord Model C Book Charger in its circulation system. When a book is presented for circulation, the borrower's card is pulled from the borrower's file located in the circulation desk (cards are filed by borrower number). The borrower's card is placed in the book charger and the book card, taken from the book pocket, is placed in the machine. The date due and borrower number will be stamped on the book card. A date due card is machine stamped with the date due and borrower number, then placed in the book pocket. The borrower's card is then stamped with the date due and the number of borrowed items penciled beside the date and refiled. The book card is filed by date due in the circulation file. To discharge a book or other printed material, the process is reversed.

Current and Proposed Systems Data

The information in the following tables was generated from the basic methodology in appendix A. The only modification for this study was that for the manual system, the actual number of charges for 1980 was used and 75 percent of that number was used for discharges. In all cases, the averages for items per year were based on 1980 figures.

Analysis of the data derived shows two of the libraries' circulation operations cost more in the automated mode than in the manual mode (tables B-1, B-3, B-7, and B-9). SMA's lower manual cost is due to an extremely conservative number of searches and reserves. If this number were increased to include the extended searches and reserves, the cost of the automated mode would be less than the manual mode. The study results indicate an extremely low average minute per charge and discharge in the manual system for the Ft Bliss Morale Support Library. If the average minute per charge were increased by just five seconds, the manual mode would be approximately $600.00 more than the automated mode. Likewise, if the average minute per discharge were increased by six seconds, the manual mode would again be more costly than the automated mode by approximately $300.00.

The following tables display by library the operating costs for both the manual and automated modes.

TABLE B-1. USAADS LIBRARY
(Manual)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/Yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	0.86	70,964	$0.12	$8,515.68	1,017.15	$7,154.11	$1,361.57
Discharging	0.87	52,223	0.11	5,744.53	757.23	5,077.36	667.17
Overdues	2.15	572	0.21	120.12	20.50	120.12	-
Search/Reserve	7.06	2,132	1.11	2,366.52	250.87	2,366.52	-
Clearance	1.16	2,733	0.16	437.28	52.84	437.28	-
Circ Filing	1.17	3,016	0.11	336.76	58.81	331.76	-
TOTAL					2,157.40	$15,487.15	$2,028.74

Total man-years = 1.04

GRAND TOTAL/YEAR = $17,515.89

TABLE B-2. SMA LEARNING RESOURCES CENTER
(Manual)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/Yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	0.75	9,583	$0.11	$1,054.13	119.79	$ 894.17	$159.96
Discharging/Snags	2.84	7,187	0.36	2,587.32	340.18	2,492.10	95.22
Overdues	2.15	2,288	0.25	572.00	81.99	545.76	26.24
Search/Reserve	3.65	485	0.49	237.65	29.50	237.65	-
Clearance	99	2,964	0.12	355.68	48.91	355.68	-
Circ Filing	0.10	1,317	0.01	13.17	2.20	13.17	-
TOTAL					622.57	$4,538.53	$281.42

Total man-years = 0.30

GRAND TOTAL/YEAR = $4,819.95

TABLE B-3. FT BLISS MORALE SUPPORT LIBRARY
(Manual)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/Yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	0.24	111,926	0.03	$3,357.78	447.70	$2,747.32	610.46
Discharging	0.15	83,945	0.02	1,678.90	209.86	1,186.31	492.59
Overdues	1.00	13,260	0.10	1,326.00	221.00	1,326.00	-
Search	5.36	1,109	0.88	975.92	99.07	975.92	-
Reserve	5.36	1,300	0.59	767.00	116.13	767.00	-
Clearance	0.20	1,213	0.02	24.26	4.04	24.26	-
Circ Filing	0.18	44,997	0.02	899.94	134.99	899.94	-
TOTAL					1,232.79	$7,926.75	$1,103.05

Total man-years = 0.59

GRAND TOTAL/YEAR $9,029.80

TABLE B-4. TRASANA TECHNICAL LIBRARY
(Manual)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	1.42	16,001	$0.18	$2,880.19	378.69	$2,696.30	$183.89
Discharging	0.90	12,000	0.12	1,440.00	180.00	1,361.88	78.12
Overdues	0.97	1,040	0.09	93.60	16.81	93.60	
Search/Reserve	4.02	295	0.40	118.00	19.77	118.00	
Clearance	9.51	121	0.90	108.90	19.18	108.90	
Circ Filing	0.51	17037	0.06	1,021.92	144.77	1,021.92	
Verify Cards Error List File Form 61					55.24 20.41 34.67	$356.83 194.92 149.07	
Computer Salary SUP* Supplies					36.00	$198.16	 $2,820.00 1,216.32
Keypunch Salary Supplies					316.56	1,541.65	 $28.58
TOTAL					1,722.00	$7,841.43	$4,326.91

Total man-years = 0.59

GRAND TOTAL = $12,168.34

*Standard Unit of Processing (Computer)

TABLE B-5. WSMR TECHNICAL LIBRARY
(Manual)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/Yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	0.80	16,004	$0.12	$1,920.48	213.39	$1,764.68	$155.80
Discharging	0.80	12,881	0.11	1,416.91	171.75	1,312.04	104.87
Overdues	7.00	156	0.91	141.96	18.20	141.96	-
Search/Reserve	5.00	9,703	0.93	9,023.79	808.58	9,023.79	-
Clearance	2.63	277	0.32	88.64	12.14	88.64	-
Circ Filing	NA	NA	NA	NA	NA	NA	NA
TOTAL					1,224.06	$12,331.11	$260.67

Total man-years = 0.59

GRAND TOTAL/YEAR = $12,591.78

TABLE B-6. WSMR MORALE SUPPORT LIBRARY
(Manual)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/Yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	0.72	54,800	$0.08	$4,384.00	657.60	$3,803.39	$580.61
Discharging	0.46	41,101	0.05	2,055.05	315.11	1,616.40	438.65
Overdues	1.49	8,528	0.11	938.08	211.78	938.08	-
Search/Reserve	5.00	7,265	0.67	4,867.55	605.42	4,867.55	-
Clearance	0.57	85	0.04	3.40	0.81	3.40	-
Circ Filing	0.17	54,800	0.01	548.00	155.27	548.00	-
TOTAL					1,945.99	$11,776.82	$1,019.26

Total man-years = 0.94

GRAND TOTAL/YEAR = $12,796.08

TABLE B-7. USAADS LIBRARY (Automated)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/Yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	0.10	70,964	$0.05	$3,548.20	118.27	$871.62	$2,676.58
Discharging	0.10	52,223	0.08	4,177.84	87.04	582.97	3,594.87
Overdues	0.42	572	0.04	22.88	4.00	22.88	-
Search/Reserve	1.00	2,132	0.16	341.12	35.53	341.12	-
Clearance	0.10	2,733	0.01	27.33	4.56	27.33	-
Circ Filing	(Not in automated system)						
TOTAL					249.40	$1,845.92	$6,271.45

Total man-years = 0.12

GRAND TOTAL/YEAR = $8,117.37

TABLE B-8. SMA LEARNING RESOURCES CENTER (Automated)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/Yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	0.10	9,583	$0.35	$3,354.05	15.97	$199.25	$3,234.80
Discharging/Snags	0.10	7,187	0.46	3,306.02	11.98	87.75	3,218.27
Overdues	0.42	2,288	0.05	114.40	16.02	114.40	-
Search/Reserve	1.00	485	0.14	67.90	8.08	67.90	-
Clearance	0.10	2,964	0.01	29.64	4.94	29.64	-
Circ Filing	(Not in automated system)						
TOTAL					56.99	$418.94	$6,453.07

Total man-years = 0.03

GRAND TOTAL/YEAR = $6,872.01

TABLE B-9. FT BLISS MORALE SUPPORT LIBRRYy (Automated)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/Yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	0.10	111,926	$0.04	$4,477.04	186.54	$1,144.72	$3,332.32
Discharging	0.10	83,945	0.05	4,197.25	139.91	866.54	3,330.71
Overdues	0.42	13,260	0.04	530.40	92.82	530.40	-
Search	1.00	1,109	0.16	177.44	18.48	177.44	-
Reserve	1.00	1,300	0.11	143.00	21.67	143.00	-
Clearance	0.10	1,213	0.01	12.13	2.02	12.13	-
Circ Filing	(Not in automated system)						
TOTAL					461.44	$2,874.23	$6,663.03

Total man-years = 0.22

GRAND TOTAL/YEAR = $9,537.26

TABLE B-10. TRASANA TECHNICAL LIBRARY (Automated)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/Yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	0.10	16,001	$0.22	$3,520.22	26.67	$188.97	$3,331.25
Discharging	0.10	12,000	0.28	3,360.00	20.00	151.33	3,208.67
Overdues	0.42	1,040	0.04	41.60	7.28	41.60	-
Search/Reserve	1.00	295	0.10	29.50	4.92	29.50	-
Clearance	0.10	121	0.01	1.21	.20	1.21	-
Circ Filing	(Not in automated system)						
TOTAL					59.07	$412.61	$6,539.92

Total man-years = 0.03

GRAND TOTAL/YEAR = $6,952.53

TABLE B-11. WSMR TECHNICAL LIBRARY (Automated)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/Yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	0.10	16,004	$0.22	$3,520.88	26.67	$220.59	$3,300.29
Discharging	0.10	12,881	0.27	3,477.87	21.47	164.01	3,313.86
Overdues	0.42	156	0.05	7.80	1.09	7.80	-
Search/Reserves	1.00	9,703	0.19	1,843.57	161.72	1,843.57	-
Clearances	0.10	277	0.01	2.77	0.46	2.77	-
Circ Filing	----------(Not in automated system)----------						
TOTAL					211.41	$2,238.74	$6,614.15

Total man-years = 0.10

GRAND TOTAL/YEAR = $8,852.89

TABLE B-12. WSMR MORALE SUPPORT LIBRARY (Automated)

Item	Min/Item (avg)	Item/Yr (avg)	Cost/Item (avg)	Cost/Yr (avg)	Mhr/Yr	Pers Cost/ Yr	Sup & Maint Cost/Year
Charging	0.10	54,800	$0.07	$3,836.00	91.33	$528.24	$3,307.76
Discharging	0.10	41,101	0.09	3,699.09	68.50	351.41	3,347.68
Overdues	0.42	8,528	0.03	255.84	59.70	255.84	-
Search/Reserve	1.00	7,265	0.13	944.45	121.08	944.45	-
Clearance	0.10	85	0.01	0.85	0.14	0.85	-
Circ Filing	----------(Not in automated system)----------						
TOTAL					340.75	$2,080.79	$6,655.44

Total Man-years = 0.16

GRAND TOTAL/YEAR = $8,736.23

The following table, showing the cost of an open-market automated system, was derived from the Boulder Public Library circulation system (Data General Equipment); expansions were made where necessary. These costs are current as of November 1980.

TABLE B-13. AUTOMATED CIRCULATION SYSTEM COSTS

Qty	Model #	Description	Purchase Price	Monthly Maint.
1	8635-NB	Eclipse 5/250 (256KB)	$ 40,500.00	$ 330.00
1	4007	I/O Board	900.00	6.00
1	8638	Writable Control Store	4,200.00	33.00
1	8650-A	Single Peripheral	1,300.00	NC
1	4010	Asynchronos Line Controller	150.00	3.00
2	6061	190 MB disk master @ $33,000	66,000.00	440.00
2	6061-A	190 MB disk slave @ $26,000	52,000.00	320.00
1	6026	9 track 800/1600 bpi 75 ips tape	15,500.00	121.00
1	6026-A	9 track 800/1600 bpi 75 ips tape slave	11,300.00	86.00
10	6086	Dasher LP2 Line Printer (180 CPS) @ $4,450.	44,500.00	550.00
I	4251	4-Slot Communications Chassis	1,900.00	24.00
1	4257	16-Line Async. MPXR (16 lines)	2,100.00	12.00
4	4261	MPXR Interface Module	640.00	8.00
10	6078	Full Terminal @ $4,400.	44,000.00	380.00
6	REL 3440	Portable terminal @ $3,300	19,800.00	120.00
1	REL 3450	Service Module	1,500.00	8.00

(Table B-13. Automated Circulation System Costs - Cont)

Qty	Model #	Description	Purchase Price	Monthly Maint
1	1012L	2-Bay Cabinet	1,900.00	NC
		Misc. Cables & Interfaces	1,500.00	NC
2		Concentrator modems @ $5,500	11,000.00	--
18		Limited Distance Modem @ $240	4,320.00	--
		Misc. options, cables, installation	4,680.00	
1	FM320R	Dial-up Modem (300 band)	350.00	--
1	CC100	Central Modem Chassis	800.00	--
1	MIIS	Operating System	15,000.00	150.00
1	ALIS	Automated Library Information System	40,000.00	250.00
SUBTOTAL			$385,840.00	$2,841.00
		Inflation and error factor (30%)	115,752.00	
GRAND TOTAL			$501,592.00	$2,841.00

Yearly Cost for Maintenance = $35,292.00

Yearly Cost for Each Library = $ 5,882.00

APPENDIX C

EFFECTIVENESS COMPARISON

Two mini-studies were conducted. One was to determine the validity of an SDI program and the amount of time it would save the participants. The second was to identify the percentage of collection duplication among the six libraries. For librarians who wish to conduct a sample use the following general rules:

a. Have a sample size of at least thirty returned questionnaries.

b. Stratify the sample if possible and use the same proportions for each population.

c. Use a random sampling technique (individuals to be questioned are selected using a random number table based upon a number assigned to each member of the population).

SDI Program

The questionnaire shown on the following page was used to randomly sample the following populations (table C-1):

TABLE C-1. SDI SURVEY

Population	Size of Population	Percentage Population Sampled	Response Results*		
			Yes	No	Not Usable
a. TRASANA Technical Personnel	249	20%	22	5	3
b. WSMR Technical Library Patron Register	3,520	5%	47	20	3
c. SMA Lesson Authors and Faculty Members	31	100%	27	1	3
d. USAADS Lesson Authors and Faculty Members in the Directorate of Training and Doctrine	363	20%	42	24	3

*Response results indicate individuals' answer to question 2 on the following questionnaire.

SDI SURVEY

Your library is considering implementing a Selective Dissemination of Information (SDI) Program provided time becomes available with installation of a proposed automated circulation system. Under this program, a person would establish a list of subject areas in which he/she is interested. The library staff would review incoming periodicals, books, technical reports, etc. for articles or chapters on these subject areas. When articles or chapters are identified, the individual would be notified.

You have been identified as a potential user of this service. Would you please take a minute to complete this questionnarire in order to help the library determine the benefits and cost effectivness of this service.

Please return the questionnaire to the library by COB 20 March 1981.

1. How many minutes/hours do you currently spend monthly (on an average) reviewing new periodicals, books, and technical reports? _____

2. Would an SDI Program save you time? (yes or no) _____

Estimate how much time per month would be saved (minutes/hours)_____

_____

3. On a scale of 0 to 10, how useful would an SDI Program be to you?

(0 = negative benefit, 5 = no benefit, 10 = beneficial)_____

4. What is your hourly pay rate? _____

5. Comments:

FIGURE C-1. SDI QUESTIONNAIRE

The following tables were developed from the data furnished on the returned questionnaire.

TABLE C-2. TOTAL SYSTEM

	TUSE*	TSAVR*	TSAVE*	SCALE*
Mean	11.471 hrs	0.763	4.804 hrs	7.413
Mode	2.000 hrs	1.000	0.000 hrs	10.000
Median	6.800 hrs	0.845	2.225 hrs	7.855
Standard Deviation	13.781 hrs	0.031	7.462 hrs	2.662
Valid Data	189	186	179	189
Missing Data	2	5	12	2

TABLE C-3. TRASANA

	TUSE*	TSAVR*	TSAVE*	SCALE*
Mean	9.138 hrs	0.724	3.731 hrs	7.483
Mode	4.000 hrs	1.000	0.000 hrs	10.000
Median	4.750 hrs	0.810	2.000 hrs	7.750
Standard Deviation	10.562 hrs	0.455	4.704 hrs	2.246
Valid Data	29	29	26	29
Missing Data	1	1	4	1

---

* *TUSE = time currently spent in review (question 1)*
TSAVR = the program would or would not save time (yes = 1, no = 0) (question 2a)
TSAVE = amount of time the program would save (question 2b)
SCALE = how useful the program would be on a scale of 0 to 10 (0 = negative benefit, 5 = no benefit, 10= beneficial)

TABLE C-4. SERGEANTS MAJOR ACADEMY

	TUSE*	TSAVR*	TSAVE*	SCALE*
Mean	15.033 hrs	1.000	6.964 hrs	8.241
Mode	5.000 hrs	1.000	5.000 hrs	10.000
Median	8.500 hrs	1.000	4.750 hrs	8.222
Standard Deviation	14.320 hrs	0.000	8.333 hrs	2.116
Valid Data	30	30	28	29
Missing Data	0	0	2	1

TABLE C-5. USA AIR DEFENSE SCHOOL

	TUSE*	TSAVR*	TSAVE*	SCALE*
Mean	11.111 hrs	0.710	5.082 hrs	7.078
Mode	0.000 hrs	1.000	0.000 hrs	10.000
Median	6.125 hrs	0.795	2.083 hrs	7.500
Standard Deviation	14.242 hrs	0.458	8.728 hrs	2.902
Valid Data	63	62	61	64
Missing Data	1	2	3	0

---

* *TUSE = time currently spent in review (question 1)*
TSAVR = the program would or would not save time (yes = 1, no = 0) (question 2a)
TSAVE = amount of time the program would save (question 2b)
SCALE = how useful the program would be on a scale of 0 to 10 (0 = negative benefit, 5 = no benefit, 10= beneficial)

TABLE C-6. WHITE SANDS

	TUSE*	TSAVR*	TSAVE*	SCALE*
Mean	11.224 hrs	0.723	4.031 hrs	7.343
Mode	2.000 hrs	1.000	0.000 hrs	10.000
Median	6.333 hrs	0.809	1.722 hrs	7.893
Standard Deviation	14.305 hrs	0.451	6.559 hrs	2.772
Valid Data	67	65	64	67
Missing Data	0	2	3	0

As can be seen from the mean of the total system, an SDI Program is perceived to be beneficial with an average total system saving of 4.8 hours/month for each participant.

The proportion of the total population (p) who think the SDI Program is a good idea is computed by:

$$\frac{\textit{total population for 1 library}}{\textit{total population of system}^{**}} \times \frac{\textit{people who said yes}}{\textit{total sample size}}$$

or

$$p = \left(\frac{249}{4163}\right)\left(\frac{21}{29}\right) + \left(\frac{31}{4163}\right)\left(\frac{30}{30}\right) + \left(\frac{363}{4163}\right)\left(\frac{44}{62}\right) + \left(\frac{3520}{4163}\right)\left(\frac{47}{65}\right)$$

$$p = .7172 \text{ or } 71.72\%$$

The value of the SDI Program (s) in regard to the scale is calculated by:

$$\frac{\textit{total population for 1 library}}{\textit{total population of system}^{**}} \times \textit{mean of the scale}$$

or

$$s = \left(\frac{249}{4163}\right)(7.483) + \left(\frac{31}{4163}\right)(8.241) + \left(\frac{363}{4163}\right)(7.078) + \left(\frac{3520}{4163}\right)(7.343)$$

$$s = 7.3348$$

**See bottom of page C-4.*

**Size of Population, table C-1.

TABLE C-7. MONETARY SAVINGS

	TRASANA	SMA	USAADS	WSMR	Total System
Mean	$82.94	$84.16	$68.22	$85.95	$80.47
Standard Deviation	$70.25	$81.11	$90.63	$92.68	$85.79
Valid Data	18	27	31	43	119
Missing Data	2	3	12	5	22

Total system dollar savings ($\hat{y}$) per month are computed by:

$$\textit{mean} \times \textit{stratified population size} \times \frac{\textit{users of system from sample}}{\textit{total sample size}}$$

or

$$\hat{y} = 82.943\left(249\right)\left(\frac{18}{30}\right) + 84.157\ (31)\left(\frac{27}{31}\right) + 68.216\ (363)\left(\frac{19}{61}\right) + 85.947\ (3520)\left(\frac{38}{87}\right)$$

$$\hat{y} = \$193,601.39$$

In compiling the SDI portion of the justification, a selected sample of only the individuals responding that the SDI program would save time was used. Following are the results of that sample:

TABLE C-8. SDI PROGRAM

Activity	Time Saved Per Month	Cost of Analyst/ Faculty Time
Sergeants Major Academy	8.04 hrs	$100.26
Air Defense School	8.14 hrs	82.95
TRADOC Systems Analysis Activity	4.28 hrs	65.01
White Sands Technical Library	5.91 hrs	83.74

Monetary savings were computed for only respondees who are currently reviewing the literature and stated that the SDI Program would save time (question 4).

Some representative comments from the questionnaires are:

- When can we start?!
- I would spend more time in the library if I could go right to articles. I rarely have time to review periodicals on the chance that there might be an article I would be interested in.
- I get little opportunity to read everything that I should. If someone could cull the material, I could keep abreast of developments. Good idea. Let's do it.
- Aside from saving me time, I think this service would bring articles/references to my attention which I did not take the time or effort to search out before. Right now, I limit my reading to the more obvious and readily available periodicals.
- Such a procudure is likely to increase the amount of useful material reviewed.
- The SDI program would reach a needed service to both instructor staff and students. It would be cost effective, save time, and enable instructors to provide a better instructional product to USAADS students.

Collection Duplication

In order to establish the percentage of duplication among the collections of the six libraries, each library was asked to select 100 titles in as random a manner as possible. These 600 titles were cumulated into a list which each library then checked against its card catalog. A copy of the cumulated list is shown on pages C-9 to C-40.

Shown below is the duplication by type of library. The results followed the expected pattern in that the morale support libraries had the largest amount of duplication. This duplication was expected because of the book kits distributed to all morale support libraries. The percentage of duplication is less than expected for the morale support libraries.

TABLE C-9. TITLE DUPLICATION BY TYPE OF LIBRARY

Type Library	No. of Titles Duplicated	% Duplication
School	75	12.5%
Technical	29	4.8%
Morale Support	132	22.0%

Tables C-10 and C-11 show the duplication by installation and number of libraries holding a title. It is interesting to note that the Ft Bliss libraries have over twice the duplication rate as White Sands Missile Range libraries.

TABLE C-10. TITLE DUPLICATION BY INSTALLATION

Installation	No. of Titles Duplicated	% Duplication
White Sands Missile Range	54	9.0
Ft Bliss	142	23.7

TABLE C-11. DUPLICATION BY NUMBER OF LIBRARIES HOLDING TITLE

No. of Libraries	No. of Titles Duplicated	% Duplication
2 libraries	178	29.7
3 libraries	82	13.7
4 libraries	27	4.5
5 libraries	6	1.0

LIBRARY DUPLICATION

Title, Author Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
1. AN ACCOUNTING PRIMER, Elwin W. Midgett, 1969		*	X			✓
2. THE ACHIEVERS, Gerald D. Bell, 1973	✓	*				
3. ACRONYMS AND INITIALISMS DICTIONARY: A GUIDE TO ALPHABETIC DESIGNATION, CONTRACTIONS, ACRONYMS, INITIALISMS, AND SIMILAR CONDENSED APPELLATIONS, Ellen T. Crowley & Robert C. Thomas, ed., 1976	✓	X	*	*		
4. ACT II: MID-CAREER JOB CHANGE, Nancy Baker, 1980		✓				
5. ADVANCED STRUCTURAL ANALYSIS, Sidney F. Borg, 1959	✓				*	
6. ADVENTURES IN EARTH HISTORY, Preston Ercelle Cloud, 1970			✓			
7. AFRICA'S DEFIANT WHITE TRIBE (VIDEO), NBC, 1977		✓				
8. AIR CONDITIONING - HOME AND COMMERCIAL, Roland E. Palmaquist, 1977						✓
9. AIR DEFENSE SYSTEMS, International Defense Review, 1976				✓		
10. THE AIR FORCE BLUE BOOK, 1959					✓	
11. AIR POLLUTION CONTROL, GUIDEBOOK FOR MANAGEMENT, 1974					✓	
12. AIRMOBILITY, John J. Tolson, 1973	*	*		✓		*
13. ALEXANDER THE GREAT'S CAMPAIGNS, Phil Barker, 1979			✓			✓
14. AMERICA GOES TO WAR, Bruce Catton, 1958		*	✓			
15. AMERICA REVISITED; 150 YEARS AFTER TOCQUEVILLE, Eugene J. McCarthy, 1978		*	✓			*
16. AMERICAN CAPITALISM, John Kenneth Galbraith, 1952	✓					X
17. AMERICAN MANNERS & MORALS, Mary Cable, 1969			*			✓
18. AMERICAN POLITICAL THOUGHT, Max J. Sidmore, 1978		✓				
19. AMERICAN POPULAR SONGS FORM THE REVOLUTIONARY WAR TO THE PRESENT, David Ewen, 1966		✓	*			*
20. THE AMERICAN SOLDIER, U. S. Army, Office of the Chief of Military History, n.d.	✓			*		

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
21. AMERICAN SOLDIERS ALSO FOUGHT, Robert Lee Bullard, 1936		✓				
22. AMERICA'S ARMY IN CRISIS; A STUDY IN CIVIL-MILITARY RELATIONS, William L. Hauser, 1973	*	*	✓		*	*
23. AMERICA'S CONCEPT OF LEADERSHIP, Sherman L. Kiser, 1954		✓				
24. AMNESTY-AN ARMY MORALE PROBLEM, USASMA Class 1, Grp 4 1973		✓				
25. AMONG THE MISSING, Jay R. Nash, 1978			*			✓
26. AN ANALYSIS OF COMPUTER SECURITY SAFEGUARDS FOR DETECTING AND PREVENTING INTENTIONAL COMPUTER MISUSE Brian Ruder, 1978				✓		
27. ANALYSIS OF ELECTRIC CIRCUITS, Frederick F. Driscoll, 1973	*				✓	
28. ANALYSIS OF THE DECISION-MAKING PROCESS IN THE CUBAN MISSLE CRISIS, William G. Skillern, 1976		✓				
29. ANATOMY OF A BATTLE, Kenneth J. Macksey, 1974	*	✓				*
30. ANATOMY OF THE ISRAELI ARMY, Gunther E. Rothenberg, 1979		✓				
31. THE ANCIENT WORLD, Vincent Mary Scramuzza, 1958			✓			
32. ANIMALS IN PERIL, David Grainger, 1978			*			✓
33. ANNUAL REVIEW, FY 78: CHIEF, NATIONAL GUARD BUREAU, U.S. Dept. of Defense, Dept. of Army, 1979		✓				
34. AWOL IN THE MILITARY, U.S. Congress. GAO, 1979		✓				
35. ANTI-PERSONNEL WEAPONS, Stockholm International Peace Reasearch Institute, 1979		✓				
36. APPLIED AND COMPUTATIONAL COMPLEX ANALYSIS, Peter Henrici, 1974				✓	*	
37. APPLIED PROBABILITY MODELS WITH OPTIMIZATION APPLICATIONS, Sheldon M. Ross, 1970				✓		

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
38. APPROXIMATING COUNTABLE MARKOV CHAINS, David Freeman, 1972				✓	*	
39. ARABIA, Jonathan Raban, 1979			*			✓
40. AREA HANDBOOK FOR GHANA, Irving Kaplan, 1971	*	*	*	✓		*
41. AREA HANDBOOK FOR RWANDA, Richard F. Nyrop, 1969	*	*	*	✓		*
42. ARMOURED VEHICLES, International Defense Review, 1980				✓		
43. ARMS TRANSFERS IN THE MODERN WORLD, Stephanie G. Neuman, 1979		✓	*			*
44. ARMY HORSE IN ACCIDENT AND DISEASE, U.S. Cavalry School, 1909		✓				
45. THE ART OF DYING, Robert E. Neale, 1973		*				✓
46. THE ASCENT OF MAN, David Pilbeam, 1972	*					✓
47. ASTRONOMY FOR BEGINNERS, Henry Brinton, 1970		✓				
48. ASTRONOMY TRANSFORMED: THE EMERGENCE OF RADIO ASTRONOMY IN BRITAIN, David O. Edge, 1976					✓	
49. ASTROMONY WITH BINOCULARS, James Muirden, 1979			*			✓
50. ATLAS OF ANCIENT EGYPT, John Baines, 1980						✓
51. ATLAS OF THE LIGHT SCATTERING CHARACTERISTICS OF MICRO-PARTICLES, 1971					✓	
52. AUTOMATED DATA PROCESSING IN TESTING, Howard W. Stoker, 1968		✓				
53. BADGES AND INSIGNIA OF THE BRITISH ARMED SERVICES, 1974		✓				
54. BASIC NUCLEAR ENGINEERING, Arthur R. Foster, 1973	✓				*	
55. BASIC READING SKILLS, Aliyah Aboul-Karim, 1979		*				✓
56. BASIC STATISTICS FOR EDUCATION AND THE BEHAVIORAL SCIENCES, Sharon L. Weinberg, 1979				✓		
57. BATTLE FOR THE BUNDU, Charles Miller, 1974			*			✓

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
58. BIBLE HANDBOOK, Merrill F. Unger, 1966		✓				
59. THE BEGINNER'S GUIDE TO THE SKIES; A MONTH BY MONTH HANDBOOK FOR STARGAZERS AND PLANET WATCHERS, Clarence Highes Cleminshaw, 1977			✓			
60. THE BEST-LAID PLANS; AMERICA'S JUVENILE COURT EXPERIMENT, Ellen Ryerson, 1978			✓			*
61. BIG FALLING SNOW, Albert Yava, 1978			*			✓
62. BIGFOOT, John Napier, 1972						✓
63. BIGOTRY IN THE UNITED STATES, Gustavus, 1943		✓				
64. A BIOGRAPHICAL DICTIONARY OF WORLD WAR II, Christopher Tunney, 1972	✓	*				*
65. BIRTH CONTROL AND FOREIGN POLICY, Nicholas Jay Demerath, 1976	*	✓				
66. BLACK ATHLETE, Edwin B. Henderson, 1976		✓				
67. BLACK NIGHT, WHITE SNOW, Harrison E. Salisbury, 1977	*		*			✓
68. BLACK PERSPECTIVE ON THE NEWS: KKK AND AMERICAN NAZI PARTY LEADERS, 1977		✓				
69. THE BLAST OF WAR, Harold Macmillan, 1968		*	✓			*
70. BLISS, PEACEMAKER; THE LIFE AND LETTERS OF GENERAL TASKER HOWARD BLISS, Frederick Palmer, 1970	✓	*	*			
71. BLITZKRIEG, Robert Wernick, 1976		✓				*
72. THE BLUFFER'S GUIDE; BLUFF YOUR WAY IN ART, LITERATURE, CINEMA, MUSIC, OPERA, WINE, David Frost, 1971		*	✓			*
73. BODY RHYTHMS, Manya Kahn, 1977						✓
74. THE BOOK OF AGATES, AND OTHER QUARTZ GEMS, Lelande Quick, 1963						✓
75. THE BOOK OF ABIGAIL AND JOHN, Abigail S. Adams, 1975						✓
76. BOOK COLLECTING: A MODERN GUIDE, Jean Peters, 1977			✓			
77. BOOKS THAT CHANGED THE WORLD, Robert B. Downs, 1978						✓

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
78. BRIGHTER THAN A THOUSAND SUNS, Robert Jungk, 1958	✓					
79. BRINGING UP THE REAR; A MEMOIR, Samuel L. A. Marshall 1979		*	*			✓
80. BUYER'S HANDBOOK FOR THE SINGLE-FAMILY HOME, Steven J. Lee, 1979			*			✓
81. BMDP: BIOMEDICAL COMPUTER PROGRAMS, W.J. Dixon, 1975				✓		
82. CACTUS COUNTRY, Edward Abbey, 1973		*	*			✓
83. CALCULUS, Lynn H. Loomis, 1977	*	*			✓	
84. THE CAMERA NEVER BLINKS, Dan Rather, 1977		*	*			✓
85. THE CANDLE BOOK, Carli Laklan, 1956						✓
86. CAREER GUIDANCE, Eli Ginzberg, 1971	✓	*				
87. CASSELL'S CONCISE GERMAN-ENGLISH, ENGLISH-GERMAN DICTIONARY, H.C. Sasse, 1966				✓		
88. C.C.I.R. XIII THE PLENARY ASSEMBLY, GENEVA, 1974, International Radio Consultative Committee, 1975				✓		
89. CHEMISTRY FOR THE MILLIONS, Richard Furnald Smith, 1972		*	✓			*
90. CHILE'S MARXIST EXPERIMENT, Robert Moss, 1974		✓				
91. CHILTON'S DIESEL GUIDE, James Joseph, 1980			*			✓
92. CHINA CROSSES THE YALU, Allen Suess Whiting, 1960	✓	*	*			
93. CHINA AND HER SHADOW, Tibor Mende, 1960			✓			
94. CHINA PASSAGE, John Kenneth Galbraith, 1973		✓				
95. CHINA'S FOUR MODERNIZATIONS, Richard D. Baum, 1980		✓				
96. CIRCUIT THEORY..., Mac Elwyn Van Valkenburg, 1974					✓	
97. CIVIL LIBERTIES UNDER THE CONSTITUTION, Mabra G. Abernathy, 1972		✓				
98. CIVIL WAR ON THE WESTERN BORDER, 1854-1865, James Monaghan, 1955		*	✓			*

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
99. CIVILIZING AMERICAN CITIES; A SELECTION OF FREDERICK LAW OLMSTED'S WRITINGS ON CITY LANDSCAPES, S.B. Sutton, 1971			✓			
100. CLEARING THE AIR, Daniel Schoor, 1977			✓			
101. CLIMATE CHANGE TO THE YEAR 2000, National Defense Univ., 1978		✓				
102. THE CLOSING CIRCLE; NATURE, MAN AND TECHNOLOGY, Barry Commoner, 1971		*	✓			*
103. COLLECTIVE BARGAINING IN THE UNITED STATES FEDERAL CIVIL SERVICE, Willem Benjamin Vosloo, 1966					✓	
104. COLOR ME BEAUTIFUL, Carole Jackson, 1979			*			✓
105. THE COMPLETE POEMS OF ROBERT SERVICE, Robert Service, 1950			✓			
106. THE COMPLETE WORLD OF KITES, Bill Thomas, 1977			*			✓
107. COMPUTER MATHEMATICS, SERIES III, 1973					✓	
108. COMPUTER ORGANIZATION AND THE SYSTEM/370, Harry Katzan, 1971					✓	
109. COMPUTER SIMULATION AND MODELING, Richard S. Lehman, 1977	✓			*	*	
110. CONFERENCE RECORD OF THE TENTH ANNUAL ACM SYMPOSIUM ON THEORY OF COMPUTING, Association for Computing Machinery, 1978				✓		
111. CONCEPTS AND APPLICATIONS OF MODERN DECISION MODELS, V.M. Rao Tummala, 1976				✓		
112. CONCISE CAMBRIDGE HISTORY OF ENGLISH LITERATURE, George Sampson, 1965		✓				
113. CONGRESS AND ARMS CONTROL, Alan Platt, 1978		✓				
114. CONTEMPORARY GAMES, Jean Belch, 1973		*				✓
115. CONSTRUCTION COST ESTIMATES, C.R. Tumblin, 1980					✓	
116. THE CONSUMER'S GUIDE TO SUCCESSFUL SURGERY, L.M. Elting, 1976						✓

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
117. CONTROL OR CONFUSION DURING NATURAL DISASTERS, Joe H. Sheard, 1970		✓				
118. COSMIC CONNECTION, Carl Sagan, 1973		✓	*			*
119. COSMOS, Carl Sagan, 1980			*			✓
120. COST CONSIDERATIONS IN SYSTEMS ANALYSIS, Gene H. Fisher, 1971				✓	*	
121. COUNTERINSURGENCY WARFARE, David Galula, 1964	✓	*	*			*
122. THE COUPON SAVER'S COOKBOOK, Beryl Marton, 1980						✓
123. COVER-UP, Seymour Hersh, 1972		✓				*
124. CROSS-CHANNEL ATTACK, Gordon A. Harrison, 1951		*		✓		*
125. CURRENT INFORMATION SOURCES IN MATHEMATICS..., Elie M. Dick, 1973					✓	
126. DANGEROUS SKY, Douglas Hill Robinson, 1973		✓				
127. THE DARK FIELDS OF VENUS, V.S. Yanovsky, 1973						✓
128. A DATA BASE MANAGEMENT APPROACH TO PRIVACY ACT COMPLIANCE, Elizabeth Fond, 1977				✓		
129. DAY OF TRINITY, Lansing Lamont, 1965			*			✓
130. DEATH AT AN EARLY AGE, Jonathan Kozol, 1967		✓	*			*
131. THE DECISION MAKING GAME: AN INTEGRATED OPERATIONS MANAGEMENT SIMULATION, Bill R. Darden, William H. Lucas, 1969				✓		
132. DECISION TABLES, Solomon L. Pollack, 1971	✓				*	
133. DELIVERANCE DAY: THE LAST HOURS OF DACHAU, Michael Selzer, 1978	*	✓	*			*
134. DESIGN AND ANALYSIS OF TIME-SERIES EXPERIMENTS, Gene V. Glass, 1975	✓					
135. DESIGN & MEMORY, Peter H. Huyck, 1980			*		*	✓
136. DESIGN FOR CHRISTIAN MARRIAGE, Dwight H. Small, 1959		✓				

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
137. DESIGN GUIDE TO ORBITAL FLIGHT, Martin Marietta Corp., 1962					/	
138. THE DESIGN OF THE MANAGEMENT INFORMATION SYSTEM, Don Q. Matthews, 1971					/	
139. DESIGNING YOUR FACE, Way Bandy, 1977			*			/
140. THE DEVELOPMENT AND TRAINING OF THE SOUTH VIETNAMESE ARMY, 1950-1972, James Lawton Collins, Jr., 1975		*		✓		*
141. A DICTIONARY OF BATTLES, Peter Young, 1978	*	*		✓		
142. DICTIONARY OF CHINESE HISTORY, Michael Dillon, 1979	✓					
143. DICTIONARY OF MATHEMATICAL SCIENCES, Leo Herland, 1965	*			✓		
144. DICTIONARY OF PRONUNCIATION, Abraham H. Lass, 1976						✓
145. DIGITAL LOGIC AND SWITCHING CIRCUITS: OPERATION AND ANALYSIS, Jefferson C. Boyce, 1975					✓	
146. DO THEY UNDERSTAND YOU? Wesley A. Wiksell, 1960	✓	*			*	
147. DOUBLE-EDGED SECRETS, Wilfred J. Holmes, 1979	*	*	*			✓
148. DYNAMIC PROBABILISTIC SYSTEMS, Ronald A. Howard, 1971				✓		
149. THE DYNAMICS OF SPECTROSCOPIC TRANSITIONS..., James D. Macomber, 1979					✓	
150. THE EASY EXPERT IN AMERICAN ANTIQUES: KNOWING, FINDING, BUYING, AND RESTORING EARLY AMERICAN FURNITURE, Moreton Marsh, 1978			✓			*
151. EAVESDROPPERS, Samuel Dash, 1971		✓				
152. ECONOMIC PLANNING AND THE IMPROVEMENT OF ECOMOMIC POLICY, Herbert Stein, 1975		✓				
153. ECONOMIC THEORY AND OPERATIONS ANALYSIS, William J. Baumol, 1977				✓		
154. ECONOMICS AND YOUR FUTURE, 1975		✓				
155. EDUCATION BY APPOINTMENT, Bartley Frank Brown, 1968	✓					
156. EDUCATION FOR THE DISABLED IN WAR AND INDUSTRY, Arthur G. Crane, 1972		✓				

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
157. EDUCATION IN SYSTEMS SCIENCE, B.A. Bayraktar..., ed., 1979				✓		
158. THE EFFECTIVE SUPERVISOR'S HANDBOOK, Louis V. Imundo, 1980			*			✓
159. EFFECTIVE USE OF ANS COBOL COMPUTER PROGRAMMING LANGUAGE, Laurence S. Cohn, 1975					✓	
160. THE EFFECTS OF WEAPONS ON ECOSYSTEMS, Julian Perry Robinson, 1979					✓	
161. EFFICIENCY OF RESERVE AND GUARD TRAINING HAS IMPROVED SINCE 1974, US Congress, GAO, 1979		✓				
162. ELECTRIC MACHINERY..., Arthur Eugene Fitzgerald, 1971	*				✓	
163. ELECTRON OPTICS, Otto Klemperer, 1971					✓	
164. ELECTRONIC CIRCUITS, DISCRETE AND INTEGRATED, Donald L. Schilling, 1968					✓	
165. ELECTRONIC DATA PROCESSING, Glyn Emery, 1968	✓				*	
166. ELECTRONIC FLASH EQUIPMENT, Verl Mott, 1974			✓			*
167. ELECTRONICS DESIGNERS' HANDBOOK, 1977	*		*		✓	
168. ELEMENTARY CONCEPTS OF MATHEMATICS, Buton W. Jones, 1970			✓			
169. AN ELEMENTARY INTRODUCTION TO THE THEORY OF PROBABILITY, B.V. Gnedenko & A. Ya. Khinchin, 1962				✓	*	
170. ELEMENTARY THEORY OF ANGULAR MOMENTUM, Morris Edgar Rose, 1957					✓	
171. ELEMENTS OF ABSTRACT AND LINEAR ALGEGRA, Hiram Paley, 1972					✓	
172. ELEMENTS OF DEFENSE ECONOMICS, Charles J. Hitch, 1967		*		✓		
173. ELSEVIER'S DICTIONARY OF ELECTRONICS AND WAVEGUIDES.., 1965					✓	
174. EMBEDDED COMPUTER SYSTEMS ACQUISITION MANAGEMENT, David T. Newman, 1980				✓		
175. EMERGENCY MEDICAL GUIDE, John Henderson, 1973			✓			*

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
176. ENCYCLOPEDIA OF COMPUTER SCIENCE, Anthony Ralston, 1976	*			✓	*	
177. THE ENERGY CRISIS, Paul Winston McCracken, 1974	✓					
178. ENERGY, ELECTRIC POWER, AND MAN, Timothy J. Healy, 1974					✓	
179. ENERGY--FROM SURPLUS TO SCARCITY?, 1974		*			✓	
180. ENGINEERING FORMULAS, Kurt Gieck, 1967					✓	
181. CASSELL'S NEW LATIN DICTIONARY, Funk & Wagnalls, 1959		*	✓			
182. ESCAPE FROM LAOS, Dieter Dengler, 1979		✓	*			*
183. ESPERANTO; A COMPLETE GRAMMAR, Ivy Reed, 1968			✓			
184. THE ESSENCE OF SELF-DEFENSE, Hidy Ochiai, 1979			*			✓
185. ESSENTIALS OF MATHEMATICS, Russell Person, 1973		✓				
186. EUROPE'S FUTURES, EUROPES' CHOICES, Alastair Buchan, 1969		✓				*
187. EVERYONE'S UNITED NATIONS, 1979		✓				
188. THE EXECUTIVE'S NEW COMPUTER..., Oliver W. Wight, 1972					✓	
189. EXERCISING PLAIN ENGLISH, Gregory Cowan, 1970		✓				
190. EXPLORING CONTEMPORARY MALE/FEMALE ROLES: A FACILITATOR'S GUIDE, Clarke G. Carney, 1977	✓	*				
191. EXPLOSIVES, Rudolf Meyer, 1977				✓	*	
192. FARM FEVER, Jerry Baker, 1977						✓
193. FATIGUE DESIGN OF MACHINE COMPONENTS, Laszlo Sors, 1971					✓	
194. FEDERAL EQUAL EMPLOYMENT OPPORTUNITY, David H. Rosenbloom, 1977	✓					
195. FINDING FACTS FAST; HOW TO FIND OUT WHAT YOU WANT TO KNOW IMMEDIATELY, Alden Todd, 1972		*	✓			*
196. FINDING YOUR WAY IN THE OUTDOORS, Robert L. Mooers, 1972		*	*			✓

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
197. FINGER PAINTING IN OILS, Elver A. Barker, 1968			✓			
198. FINITE MATHEMATICS AND CALCULUS..., Guillermo, 1971	*				✓	
199. FIRST COURSE IN CALCULUS, Serge Lang, 1973		✓	*			
200. THE FIRST-TIME MANAGER, Loren B. Belker, 1978	*			*		✓
201. 540 LITTLE KNOWN FACTS ABOUT THE BIBLE, Robert Tuck, 1980			✓			*
202. THE FLIGHT OF DRAGONS, Peter Dickinson, 1979			✓			*
203. THE FLIGHT OF UNCONTROLLED ROCKETS, Feliks Ruvimovich Gantmakher, 1964	*				✓	
204. FLOWS IN NETWORKS, L.R. Ford, Jr., 1962				✓		
205. FLYING SAFELY, Richard L. Collins, 1977	✓					
206. FLYING SHIPS; HOVERCRAFT AND HYDROFOILS, Malcolm W. Cagle, 1970		*	*			✓
207. FOLKLORE ON THE AMERICAN LAND, Duncan Emrich, 1972		✓	*			
208. FORMATIVE INSTRUCTIONAL PRODUCT EVALUATION, Tom E. Lawson, 1974	✓					
209. FORTRAN IV, Jehosua Friedman, 1975	*			✓		
210. FORTRAN WITH ENGINEERING APPLICATIONS, Daniel D. McCracken, 1967					✓	
211. FORTRESS THAT NEVER WAS, Rodney Minott, 1964		✓	*			
212. FREEDOM TO LEARN; A VIEW OF WHAT EDUCATION MIGHT BECOME, Carl Ransom Rogers, 1969	✓	*	*			
213. THE FRENCH. TRANSLATED FROM THE FRENCH, Francois Nourissier, 1968			✓			*
214. FUNCTIONAL ANALYSIS OF INFORMATION PROCESSING; A STRUCTURED APPROACH FOR SIMPLIFYING SYSTEMS DESIGN, Grayce M. Booth, 1973	*			✓		
215. FUNDAMENTALS OF COBOL PROGRAMMING, Carl Feingold, 1973					✓	
216. FUNDAMENTALS OF ELECTRIC CIRCUITS, David A. Bell, 1978			✓			

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
217. FUNDAMENTALS OF TRANSISTORS, Paul E. Sanborn, 1970			✓			
218. GALAXIES, NUCLEI, AND QUASARS, Fred Hoyle, 1965						✓
219. GAS ANALYSIS INSTRUMENTATION, A. Verdin, 1973					✓	
220. THE GASP IV SIMULATION LANGUAGE, A. Alan B. Pritsker, 1974				✓	*	
221. GEMS AND MINERALS OF AMERICA, Jay E. Ransom, 1974	*	*	*			✓
222. GENERAL PHYSICS, Gordon James Aitchison, 1970					✓	
223. A GENIUS FOR WAR, Trevor Nevitt Dupuy, 1977	✓	*	*			*
224. GERMAN RADIO PROPAGANDA, Ernst Kris, 1944	*	✓				
225. GERMAN RAIDER OF WORLD WAR II, August K. Muggenthaler, 1977	*		*			✓
226. GERMAN STEP-BY-STEP, Charles Frambach Berlitz, 1979	*	*	✓			*
227. GLACIAL AND QUATERNARY GEOLOGY, Richard Foster Flint, 1971					✓	
228. GLOSSARY OF MAPPING, CHARTING, AND GEODETIC TERMS, Defense Mapping Agency, 1973	*			✓		
229. GOMILLION VERSUS LIGHTFOOT, Bernard Taper, 1962		✓	*			*
230. THE GOVERNMENT AND POLITICS OF TEXAS , Clifton McCleskey, 1972	✓	X				
231. GREAT AMERICAN BATTLES, Robert Leckie, 1968	✓					
232. GUERRILLAS IN POWER; THE COURSE OF THE CUBAN REVOLUTION. TRANSLATED FROM THE FRENCH, Arnold Pomerans, 1970	✓	*				
233. GUIDE TO BEES AND HONEY, Ted Hooper, 1976			*			✓
234. A GUIDE TO THE LIBARARY OF CONGRESS CLASSIFICATION, John P. Immroth, 1971	*			✓		
235. A GUIDEBOOK FOR INTRODUCING LIBRARY SKILLS TO KINDERGARTEN AND PRIMARY GRADES, Margeret V. Beck, 1967						✓

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
236. GUIDELINES FOR FIELD STUDIES IN ENVIRONMENTAL PERCEPTION, Anne, V.T. Whyte, 1977					✓	
237. GUN OWNER'S BOOK OF CARE, REPAIR, AND IMPROVEMENT, Roy F. Dunlap, 1974		*	✓			
238. HANDBOOK OF ELEMENTAL ABUNDANCES IN METEORITES, 1971					✓	
239. HANDBOOK OF EVALUATION RESEARCH, Elmer L. Struening, 1975				✓		
240. HANDBOOK OF HEAVY CONSTRUCTION, Frank Whitworth Stubbs, 1959					✓	
241. HANDBOOK OF OPERATIONAL AMPLIFIER CIRCUIT DESIGN, David F. Stout, 1976	✓				*	
242. HANDBOOK OF SOCIAL PSYCHOLOGY, Gardner Lindzey, 1954	*	✓				
243. HARBRACE COLLEGE HANDBOOK, John Cunyus Hodges, 1967		X			✓	
244. THE HIGH FRONTIER, Gerald K. O'Neill, 1976		*	*			✓
245. HIGH TECHNOLOGY, Steven Schneider, 1980			✓			
246. HI-PERFORMANCE TUNING GUIDE, Moter (New York), 1973					✓	
247. HISTORY OF THE BRITISH ARMY, Peter Young, 1970	✓	*				
248. A HISTORY OF PHILOSOPHY IN AMERICA, Elizabeth Flower, 1977	*		✓			*
249. HOME FROM THE WAR: VIETNAM VETERANS: NEITHER VICTIMS OR EXECUTIONERS, Robert Jay Lifton, 1973	✓	*	*			
250. HOMEOWNERS COMPLETE GUIDE, Ralph Treves, 1974		✓	*			
251. HOW TO BUILD SPEAKER ENCLOSURES, Alexis Badmaieff, 1[illegible]						✓
252. HOW TO DEBATE; A TEXTBOOK FOR BEGINNERS, Harrision Boyd Summers, 1963		*	✓			*
253. HOW TO DISCIPLINE, WITH LOVE, Fitzhugh Dodson, 1977						✓
254. HOW TO DOUBLE YOUR VOCABULARY, Sam[illegible] Stephenson Smith, 1964	✓	*				*
255. HOW TO FIX IT, Morton J. Schultz, [illegible]971	*	*	✓			*

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL
256. HOW TO MAKE THINGS GO YOUR WAY, Ralph Charell, 1979					
257. HOW TO READ AND UNDERSTAND ENGINEERING, C.J. Rogers, 1972					✓
258. HOW TO READ AND WRITE IN COLLEGE; A COMPLETE COURSE, Richard H. Dodge, 1967		X	✓		
259. HOW TO SOLVE PROBLEMS: ELEMENTS OF A THEORY OF OF PROBLEMS AND PROBLEM SOLVING, Wayne A. Wickelgren, 1974		*		✓	*
260. HOW TO USE INTEGRATED-CIRCUIT LOGIC ELEMENTS, Jack W. Streater, 1969					✓
261. HOW TO USE THE MAGIC OF SELF-CYBERNETICS, Ben B. Smith, 1971					✓
262. HOW WE WON THE WAR, Vo Nguyen Giap, 1976				✓	
263. ICON AND THE AXE, James H. Billington, 1966		✓	*		
264. IGNITION! AN INFORMAL HISTORY OF LIQUID ROCKET PROPELLANTS, John D. Clark, 1972	*	✓			*
265. AN ILLUSTRATED GLOSSARY OF DECORATED ANTIQUES: FROM THE LATE 17TH CENTURY TO THE EARLY 20TH CENTURY, Mary Jane Clark, 1972			✓		
266. ILLUSTRATED MEDICAL AND HEALTH ENCYCLOPEDIA, Morris Fishbein, 1959	✓		X		
267. INDIAN SIGNS AND SIGNALS, George Fronval, 1978					
268. INFANTRY WEAPONS, International Defense Review, 1978				✓	
269. INFORMATION SYSTEMS, John G. Burch, 1974		✓			*
270. INTEGRATED DIGITAL ELECTRONICS, Walter A. Triebel, 1979					✓
271. INTERACTIVE DATA ANALYSIS: A PRACTICAL PRIMER, Donald R. McMeil, 1977				✓	
272. INTERRACIAL COMMUNICATION, Andrea L. Rich, 1976		X	✓		
273. I. T., INTERVAL TRAINING FOR LIFETIME FITNESS, Jeffery N. Bairstow, 1980					

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
274. IN THE SHADOW OF HISTORY, James Frank Dobie, 1939	✓					
275. AN INTRODUCTION TO ABSTRACT HARMONIC ANALYSIS, Lynn H. Loomis, 1953					✓	
276. INTRODUCTION TO ANALOG COMPUTATION; A SELF-INSTRUCTIONAL PROGRAM, American Institute of Chemical Engineers, 1965					✓	
277. AN INTRODUCTION TO COMPUTERS IN INFORMATIONS SCIENCE, Susan Artandi, 1972		*			✓	
278. INTRODUCTION TO DYNAMIC PROGRAMMING, George L. Nemhauser, 1966	*			*	✓	
279. INTRODUCTION TO LASERS AND THEIR APPLICATIONS, Donald C. O'Shea, 1977					✓	
280. AN INTRODUCTION TO MATRICES, VECTORS, AND LINEAR PROGRAMMING, Hugh G. Campbell, 1977	✓				*	
281. INTRODUCTION TO MONOPULSE, Donald R. Rhodes, 1980					✓	
282. AN INTRODUCTION TO RADIATION PROTECTION, Alan Douglas Martin, 1972					✓	
283. INTRODUCTION TO SOLID STATE PHYSICS, Charles Kittel, 1976			✓		*	*
284. INTRODUCTION TO SYSTEMS THEORY, Hinrich R. Martens, 1969					✓	
285. THE INVISIBLE SOLDIER; THE EXPERIENCE OF THE BLACK SOLDIER, WWII, 1975	✓	*	*			*
286. INVITATION TO GEOLOGY, William H. Matthews, 1971			*			✓
287. IRE DICTIONARY OF ELECTRONICS TERMS AND SYMBOLS, Institute of Radio Engineers, 1961					✓	
288. ISOSTACY AND ISOSTATIC HYPOTHESIS, E.N. Lyustikh, 1960					✓	
289. JANUS: A SUMMING UP, Arthur Koestler, 1978		*	✓			✓
290. JAPANESE ARMY AND THE SOVIET UNION, Katsu H. Young, 1976		✓				
291. JAPANESE-ENGLISH DICTIONARY, Frank Brinkley, 1963	✓					

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
292. THE JEWS; STORY OF A PEOPLE, Howard Melvin Fast, 1968			✓			
293. JOGGER'S CATALOG, Robert E. Burger, 1978		✓				
294. JUMP INTO SHAPE, Sidney Filson, 1978		✓				
295. JUSTICE IN EVERYDAY LIFE: THE WAY IT REALLY WORKS, Howard Zinn, 1974	✓	*				
296. KAISER, Virginia Spencer Cowles, 1963	*	✓	*			
297. KARL MARX, Richard E. Olsen, 1978	✓					
298. KHRUSHCHEV: THE YEARS IN POWER, Roy Alcksandrovich Medvedev, 1976			✓			*
299. KINETIC FAMILY DRAWINGS (K-F-D); AND INTRODUCTION TO UNDERSTANDING CHILDREN THROUGH KINETIC DRAWINGS, Robert C. Burns, 1970			✓			
300. THE KNOW-AND DO MANAGER, Lynn W. Whiteside, 1966	✓					
301. KOREAN-ENGLISH DICTIONARY, Samuel E. Martin, 1967		✓	*			
302. KRIEGIE, Kenneth W. Simmons, 1960		✓	*			
303. LACE CUFFS AND LEATHER APRONS, Marion L. Starkey, 1972		✓				
304. LANGE'S HANDBOOK OF CHEMISTRY, Norbert Adolph Lange, 1979					✓	X
305. THE LAROUSSE GUIDE TO ASTRONOMY, David Baker, 1978			*			✓
306. LASER PHYSICS, Marray Sargent II, Marlan O. Scully & Willis E. Lamb, Jr., 1974				✓	*	
307. THE LAST EAGLE; THE STORY OF KHAN, Ben East, 1974						✓
308. THE LAST OFFENSIVE, Charles Brown MacDonald, 1973	✓	*		*		
309. THE LAST PLACE ON EARTH, Harold Hayes, 1977			✓			*
310. LATIN AMERICA, THE HOPEFUL OPTION, Eduardo Frie Montalvo, 1978		✓				
311. LAW ENFORCEMENT BIBLE, Robert A. Scanlon, ed., 1978	*	✓				
312. LEADERSHIP ENVIRONMENT FOR THE NCO IN TODAY'S ARMY, Harley L. Gill, 1974		✓				

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
313. LEADERSHIP ON THE JOB..., Supervisory Management, 1966		*			✓	
314. LEARNING FORM CHANGING, Clayton P. Alderfer, 1975	✓					
315. LEARNING THROUGH SIMULATION GAMES, Philip H. Gillispie, 1973				✓		
316. LEGAL ENVIRONMENT OF BUSINESS, Robert N. Corley, 1977		✓				
317. LIBERAL DEMOCRACY IN WORLD AFFAIRS, Laurence I. Radway, 1969		✓	*			
318. LIFE OF PLANTS, Edred John H. Corner, 1964		✓				
319. LIFELINES, Lynn Caine, 1978						✓
320. LIFELINES THROUGH THE ARCTIC, William Samuel Carlson, 1962	✓					
321. LIFE-SPANS, OR, HOW LONG THINGS LAST, Frank Kendig and Richard Hutton, 1980			✓			*
322. LIGHT IN HOURS OF DARKNESS; READING FOR THE GRIEF STRICKEN, Dorothy Mason Fuller, comp., 1971			✓			
323. LIGHT-HORSE HARRY, Noel B. Gerson, 1966		✓	*			*
324. LIN PIAO ON "PEOPLE'S WAR", D.P. Mozinger, 1965		✓				
325. LINEAR ALGEBRA AND MATRIX THEORY, Evar D. Nering, 1970				✓		
326. LINEAR OPERATORS IN HILBERT SPACE, David W. Ewing, ed., 965					✓	
327. LIVING MAMMALS OF THE WORLD, Ivan Terence Sanderson, 1955	✓	*				
328. LIVING WITH ANXIETY, Randolph C. Miller, 1971		✓				
329. LIVING WITH HIGH BLOOD PRESSURE, Joyce D. Margie, 1978		*	*			✓
330. LOCAL RESPONSES TO GLOBAL PROBLEMS, Bruce Stokes, 1978		✓				
331. LONELINESS: THE FEAR OF LOVE, Ira J. Tanner, 1973						✓
332. LONG-RANGE MISSLE-EQUIPPED: A SOVIET VIEW, Boris Alekseevich Vasilev, 1979				✓		

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
333. LONG-RANGE PLANNING FOR MANAGEMENT, Werner Schmeidler, 1972					✓	
334. LOOK IT UP, Rudolf F. Flesch, 1977		*	*			✓
335. THE LORNE GREENE BOOK OF REMARKABLE ANIMALS, Lorne Greene, 1980			*			✓
336. LOSING GROUND, John G. Mitchell, 1975		✓				
337. LYING: MORAL CHOICE IN PUBLIC AND PRIVATE LIFE, Sisseia Bok, 1978	*	✓	*			
338. McGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS, 1974		*		X	✓	*
339. MACHINE TAKEOVER: THE GROWING THREAT TO HUMAN FREEDOM IN A COMPUTER-CONTROLLED SOCIETY, Frank Honywill George, 1977	✓					
340. MAGAZINES FOR LIBRARIES, William A. Katz, 1978		✓	*			*
341. THE MAGNIFICENT BUILDERS AND THEIR DREAM HOUSES, Joseph J. Thorndike, 1978			*			✓
342. THE MAGNIFICENT WEST; GRAND CANYON, Milton Goldstein, 1977			*			✓
343. MAKING OF A PSYCHIATRIST, David S. Viscott, 1972		✓	*			*
344. MANAGEMENT SYSTEMS IN EDUCATION, Paul A. Montello, 1975	✓					
345. THE MASK OF JOVE; A HISTORY OF GRAECO-ROMAN CIVILIZATION FROM THE DEATH OF ALEXANDER TO THE..., Stringfellow Barr, 1966			✓			
346. THE MASTER GUIDE TO ELECTRONIC CIRCUITS, Thomas M. Adams, 1980			*			✓
347. MATHEMATICAL METHODS IN OPERATIONS RESEARCH, Ronald L. Gue & Michael E. Thomas, 1968				✓		
348. MATHEMATICS FOR EXTERIOR BALLISTICS, Gilbert Ames Bliss, 1944	✓				*	
349. THE MATURE WOMAN'S BACK-TO-WORK BOOK, Therese C. Unumb, 1980			*			✓
350. THE MEANING OF LIMITED WAR, Robert McClintock, 1967			✓			

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
351. MEDIEVAL WARFARE, Hansjoachim W. Koch, 1978	✓					
352. THE MEN-OF-WAR, David Howarth, 1978		*	✓			*
353. METHODS FOR STATISTICAL DATA ANALYSIS OF MULTIVARIATE OBSERVATIONS, R. Gnanadesikan, 1977				✓	*	
354. METHODS OF MATHEMATICAL PHYSICS, Sir Harold Jeffreys, 1956					✓	
355. THE MICRO MILLENNUIM, Christopher R. Evans, 1980			*			✓
356. THE MILITARY AND THE PROBLEM OF LEGITIMACY, Gwyn Harries-Jenkins, Jacques van Doorn, ed., 1976	✓					
357. MINICOMPUTERS AND MICROPROCESSORS..., 1976					✓	
358. MISSILES OF THE WORLD, Michael John Haddrick Taylor, 1973	✓	X	*		*	
359. MODELING AND ANALYSIS USING Q-GERT NETWORKS, A. Alan B. Pritsker, 1977	*			✓		
360. MODERN APPLIED ALGEBRA, Garret Birkhoff, 1970			*	*	✓	
361. MORALITY IS FOR PERSONS, Bernard Haring, 1971			✓			
362. THE MOTIVATED WORKING ADULT, Ray C. Hackman, 1969					✓	
363. MOTIVATION AND PERSONALITY, Abraham H. Maslow, 1970	*	X	✓		*	
364. MULTIDIMENSIONAL GAUSSIAN DISTRIBUTIONS, Kenneth S. Miller, 1964					✓	
365. MULTIVARIATE NOMINAL SCALE ANALYSIS; A REPORT ON A NEW ANALYSIS TECHNIQUE AND A COMPUTER PROGRAM, Frank M. Andrews & Robert C. Messenger, 1973				✓		
366. NAMES ON THE GLOBE, George Rippey Stewart, 1975	✓					
367. NATIONAL FIRE CODES, National Fire Protection Association, 1979-1980					✓	
368. NATIONALISM AND COMMUNISM, Hugh Seton-Watson, 1964		✓				*
369. THE NATURE OF HUMAN AGGRESSION, Ashley Montagu, 1976	✓	*				
370. NAVIES IN THE AMERICAN REVOLUTION, Myron J. Smith, 1973		✓				

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
371. NEGOTIATING SECURITY: AN ARMS CONTROL READER, William H. Kincade & Jeffrey D. Porro, 1979		*		✓		
372. NEW INDUSTRIAL STATE, John Kenneth Galbraith, 1967		✓	*			*
373. NEW MILITARY, Morris Janowitz, 1964	*	✓	*			*
374. NEW RUDMAN'S QUESTIONS & ANSWERS ON THE CLEP SUBJECT EXAMINATION IN AMERICAN GOVERNMENT, Jack Rudman, 1977		✓				
375. NICARAGUA, AN ALLY UNDER SIEGE, Belden Bell, ed., 1978	✓					
376. NICKNAMES OF CITIES AND STATES OF THE U.S., Joseph N. Kane, 1965			*			✓
377. THE NIGHT THE REVOLUTION BEGAN; THE BOSTON TEA PARTY, 1773, Wesley S. Griswold, 1972		*	✓			
378. NONPARAMETRIC METHODS IN COMMUNICATIONS, O. Papantoni-Kazakos, Dimitri Kazakos, ed., 1977				✓		
379. THE NORMANS IN EUROPEAN HISTORY, Charles Homer Haskins, 1959			✓			
380. NORTHWEST PASSAGE, William D. Smith, 1970		*	✓			
381. NUCLEAR MAGNETIC RESONANCE..., John D. Roberts, 1959					✓	
382. OF GARRY OWEN IN GLORY, Melbourn Chandler, 1960	*	✓	*			
383. THE OFFICIAL EXPLANATIONS, Paul Dickson, 1980			✓			*
384. OMNITAB; A COMPUTER PROGRAM FOR STATISTICAL AND NUMERICAL ANALYSIS, Joseph Hilsenrath, et al, 1966				✓		
385. OIL RESOURCES: WHO GETS WHAT HOW?, Kenneth W. Dam, 1976	✓					
386. ONLY A GRINGO WOULD DIE FOR AN ANTEATER, Michael H. Milts, 1979			*			✓
387. ON THE ART OF DRAWING, Robert Fawcett, 1958		✓				
388. OPERATIONAL AMPLIFIERS..., James K. Roberge, 1975			*		✓	
389. OPERATIONAL RESEARCH TECHNIQUES, Douglas White, William Donaldson, Norman Lawrie, 1969-74				✓	*	

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
390. OPERATIONS AUDITING, Roy A. Lindberg, 1972	✓				*	
391. OPERATIONS RESEARCH: AN INTRODUCTION, Charles M. Harvey, 1979				✓		
392. OPTIMIZATION AND OPERATIONS RESEARCH, W. Oettli & K. Ritter, ed., 1976				✓		
393. OPTIMIZATION THEORY FOR LARGE SYSTEMS, Leon S. Lasdon, 1970				✓	*	
394. ORGANIZATIONS: STRUCTURE, PROCESSES, BEHAVIOR, James L. Givson, 1973	✓					
395. OUR GREATEST BATTLE (THE MEUSE-ARGONNE), Frederick Palmer, 1924		✓				
396. PAPER REVOLUTIONARIES, Laurence Leamer, 1972		✓				
397. PARAPSYCHOLOGY AND THE NATURE OF LIFE, John L. Randal, 1975		*	*			✓
398. THE PARMACOLOGICAL BASIS OF THERAPEUTICS; A TEXTBOOK OF PARAMACOLOGY, TOXICOLOGY, AND THERAPEUTICS FOR PHYSICIANS AND MEDICAL STUDENTS, Louis Sanford Goodman, 1970	✓					
399. PARTICIPATION TRAINING FOR ADULT EDUCATION, Paul Emile Bergevin, 1965	✓	*				
400. PASSAGE OF POWER, Robbins Burling, 1974		✓				
401. THE PATH BETWEEN THE SEAS, David G. McCullough, 1977	*	*	*			✓
402. PATTERN-DIRECTED INFERENCE SYSTEMS, D.A. Waterman, Frederick Hayes-Rothe, ed., 1978				✓		
403. PATTON: A STUDY IN COMMAND, Hubert Essame, 1974	✓	*	*			
404. PEBBLES AS A HOBBY, Janet Barber, 1972						✓
405. PEOPLE-ORIENTED COMPUTER SYSTEMS; THE COMPUTER IN CRISIS, Edward A. Tomeski & Harold Lazarus, 1975			✓		*	
406. PERMANENT WEIGHT CONTROL, Michael J. Mahoney, 1976		*				✓
407. THE PETER PRESCRIPTION; HOW TO BE CREATIVE, CONFIDENT, & COMPETENT, Laurence J. Peter, 1972		*	✓			*

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
408. THE PHILOSOPHERS OF GREECE, Robert Sherrick Brumbaugh, 1964			✓			
409. THE PHILOSOPHY OF KANT; IMMANUEL KANT'S MORAL AND POLITICAL WRITINGS, Immanuel Kant, 1949			✓			X
410. PIPE CLAY AND DRILL, Richard Goldhurst, 1977		*	✓			*
411. THE POLICY PREDICAMENT; MAKING AND IMPLEMENTING PUBLIC POLICY, George C. Edwards, 1978	✓					
412. POWERS OF MIND, Adam Smith (i.e., G.J.W. Goodman), 1975			✓			
413. PRE-ALGEBRA, Harry H. Jonas, 1972	*				✓	
414. PRINCIPLES & APPLICATIONS OF SOLAR ENERGY, Paul N. Cheremisinoff, 1978					✓	
415. PRINCIPLES OF DISCRETE EVENT SIMULATION, George S. Fishman, 1978				✓		
416. PROBABILITY, STATISTICS, AND DATA ANALYSIS, Oscar Kempthorne, 1971	✓				*	
417. PROBLEMS OF ETHICS, Moritz Schlick, 1962		✓				
418. PROCEEDINGS OF A SYMPOSIUM, APPLICATIONS OF COMPUTERS TO NUCLEAR & RADIO-CHEMISTRY, N.D.					✓	
419. PROCEEDINGS OF THE SUMMER COMPUTER SIMULATION CONFERENCE, Association for Computing Machinery, 1971-				✓		
420. PROGRAMMING FORTRAN 77: A STRUCTURED APPROACH, J.N.P. Hume, R.C. Holt, 1979				✓		
421. PROFILES OF THE FUTURE; AN INQUIRY INTO THE LIMITS OF THE POSSIBLE, Arthur C. CLarke, 1973			✓			*
422. PROGRAMMING IN STANDARD FORTRAN 77, A. Balfour, 1979				✓		
423. PROSPECTING FOR GEMSTONES AND MINERALS, John Sinkankas, 1970			✓			
424. PROTOCOL: THE COMPLETE HANDBOOK OF DIPLOMATIC, OFFICAL AND SOCIAL USAGE, Mary Jane McCaffree & Pauline Innis, 1977	*	*		✓		*

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
425. PSYCHOLOGICAL RESEARCH ON FLEXIBLE GUNNERY TRAINING, Nicholas Hobbs, 1947				✓		
426. PSYCHOLOGY ENCYCLOPEDIA, 1973		✓				
427. PSYCHOLOGY OF WOMEN; A STUDY OF BIO-CULTURAL CONFLICTS, Judith M. Bardwick, 1971			✓			
428. PULSE, DIGITAL, AND SWITCHING WAVEFORMS; DEVICES AND CIRCUITS FOR THEIR GENERATION AND PROCESSING, Jacob Millman & Herbert Taub, 1965	*			✓	*	
429. PULSE FUNDAMENTALS, John M. Doyle, 1973	*				✓	
430. THE PURPOSES OF REFERENCE MEASUREMENT, American Library Association, 1978				✓		
431. QUANTITATIVE ANALYSIS, Willis Conway Pierce, 1958	✓		*			
432. QUANTUM THEORY, D.R. Bates, ed., 1961	*				✓	
433. QUEEN OF SHEBA, Joy Adamson, 1980			*			✓
434. QUEST FOR EQUILIBRIUM, George Liska, 1977	*	✓				
435. QUEUEING THEORY IN OR, E. Page, 1972				✓	*	
436. QUEUES, D.R. Cox & Walter L. Smith, 1961				✓	*	
437. QUOTES FOR THE MILITARY WRITER, US Dept of the Army, Command Information Unit, n.d.	✓	*				*
438. RADAR FOR NAVIGATION AND SAFETY, Jack West, 1978	✓					
439. RADARS, David K. Barton, 1974				*	✓	
440. THE RADIO AMATEUR'S HANDBOOK, Archie Frederick Collins, 1970			*		✓	X
441. RADIO DIRECTION-FINDING AND THE RESOLUTION OF MULTI-COMPONENT WAVE-FIELDS, P.J.D. Gething, 1978				✓		
442. RADIO ENGINEERING HANDBOOK, Keith Henney, 1959			X	✓	*	X
443. THE RAID, Benjamin F. Schemmer, 1976	*	*	*	✓		*
444. RAISING KIDS O.K., Dorothy E. Babcock, 1976						✓

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
445. RANDOM SETS AND INTEGRAL GEOMETRY, Georges Matheron, 1975					✓	
446. RARE METALS HANDBOOK, Clifford A. Hampel, 1954, 1961	✓				✓	
447. READING IMPROVEMENT: A COMPLETE COURSE FOR INCREASING SPEED AND COMPREHENSION, Barbara Macknick Klaeser, 1977		*	✓			
448. READINGS IN MEASUREMENT AND EVALUATION, Norman Edward Gronlund, 1968	✓					
449. REAR AREA SECURITY IN RUSSIA: THE SOVIET SECOND FRONT BEHIND THE GERMAN LINES, 1951	*			✓		
450. REFERENCE MANUAL FOR OFFICE WORKERS, Louis C. Nanassy, William Shelden, Jo Ann Lee, 1977				✓		
451. REMEMBER THE DAYS, Milton Meltzer, 1974		*				✓
452. RESISTIVE AND REACTIVE CIRCUITS, Albert Paul Malvino, 1974	✓				*	
453. RESPONSIBILITIES OF THE NCO IN TODAY'S ARMY, Richard J. Seitz, 1974		✓				
454. THE RIDDLE OF MACARTHUR; JAPAN, KOREA, AND THE FAR EAST, John Gunther, 1951	✓	*	*			*
455. THE RISE AND FALL OF THE SHAH, Amin Saikal, 1980		*	*			✓
456. ROCKET PROPULSION ELEMENTS..., George P. Sutton, 1963	*		*		✓	X
457. THE ROLE OF THE BRAIN, Ronald H. Bailey, 1975			*			✓
458. ROMANIA, A PROFILE, Ian M. Matley, 1970		*	✓			*
459. A RUMOR OF WAR, Philip Caputo, 1977	✓	*	*			*
460. RUN, RIVER, RUN, Ann Zwinger, 1975			*			✓
461. RUSSIA AND THE SOVIET UNION; A MODERN HISTORY, Warren Bartlett Walsh, 1958	*		✓			*
462. THE SAMPLE SURVEY: THEORY AND PRACTICE, Donald P. Warwick, 1975	✓					

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
463. THE SCATTERING OF LIGHT, AND OTHER ELECTROMAGNETIC RADIATION, Milton Kerker, 1969				✓	*	
464. SCIENCE IN EVERYDAY LIFE, William C. Vergara, 1980			✓			*
465. THE SECOND INDOCHINA WAR; CAMBODIA AND LAOS, Wilfred G. Burchett, 1970	✓					
466. THE SENSES, Wolfgang von Buddenbrock, 1958	✓					
467. SETTING NATIONAL PRIORITIES, 1976-		*	*	✓		X
468. SHANA ALEXANDER'S STATE-BY-STATE GUIDE TO WOMEN'S LEGAL RIGHTS, Shana Alexander, 1975		*	✓		*	
469. SHORT GUIDE TO CLAUSEWITZ ON WAR, Karl von Clausewitz, 1967		✓				*
470. THE SINO-SOVIET CONFRONTATION: IMPLICATIONS FOR THE FUTURE, Harold C. Hinton, 1979		*		✓		
471. SIX YEARS WITH GOD: LIFE INSIDE REV. JONES' PEOPLE'S TEMPLE, Jeanne Mills, 1979			✓			*
472. SLEEP AND DREAMING, Earnest Hartmann, ed., 1970			✓			
473. SMALL ARMS IN PROFILE, 1973		✓				
474. THE SMALL BUSINESS SURVIVAL GUIDE, Joseph Mancuso, 1980						✓
475. SMALL-SAMPLE REACTIVITY MEASUREMENTS IN NUCLEAR REACTORS, Wesley K. Foell, 1972	*				✓	
476. THE SOCIOBIOLOGY DEBATE: READINGS ON ETHICAL AND SCIENTIFIC ISSUES, Arthur L. Caplan, ed., 1978	✓					
477. A SOLDIER'S STORY, Omar N. Bradley, 1951	*	*	*	✓		*
478. SHOCK WAVES AND DETONATIONS IN GASES, Rem Ivanovich Soloukhin, 1966					✓	
479. SNOW, Ruth Kirk, 1977			✓			
480. SOFT JEWELRY: DESIGN, TECHNIQUES, MATERIALS, Nancy Howell-Koehler, 1976			✓			
481. SOLAR ENERGY: TECHNOLOGY AND APPLICATIONS, James Richard Williams, 1974	*		✓		*	*

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
482. SOLUTION OF PROBLEMS IN TELECOMMUNICATIONS, Cecil Stanley Henson, n.d.					✓	
483. SOVIET MILITARY THOUGHT SERIES, Nikolai Andreevich Lomov, ed., 1975	✓	*		*		
484. THE SOVIET THREAT: MYTHS AND REALITIES, Grayson Kirk & Nils H. Wessell, ed., 1978	*	*		✓		
485. SOUTH TO THE NAKTONG, NORTH TO THE YALU: JUNE-NOVEMBER 1950, Roy Edgar Appleman, 1961	*	*		✓		*
486. SPANISH REVIEW GRAMMAR; CON TEMAS ORALES AND ESCRITOS, Vincenzo Cioffari, 1972			✓			
487. STABILITY THEORY OF DYNAMIC SYSTEMS, Jacques Leopold Willems, 1970					*	
488. STANDARD VIETNAMESE-ENGLISH DICTIONARY, Le-ba-Khanh & Le-be-Kong, 1955	*		✓			
489. STANDING ARMY CONTROVERSY IN ENGLAND, Lois G. Schwoerer, 1976		✓				
490. STATISTICAL METHODS FOR BEHAVIORAL SCIENCE RESEARCH, Leonard A. Marascuilo, 1971	✓					
491. STATISTICAL QUALITY CONTROL, Eugene Lodewick Grant, 1952					✓	*
492. STATISTICAL REASONING, Lloyd Rosenberg, 1971					✓	
493. STATISTICAL SURVEY TECHNIQUES, Raymond J. Jessen, 1978				✓	*	
494. STICK AND RUDDER, Wolfgang Langewiesche, 1944						✓
495. STOCHASTIC OPTIMAL LINEAR ESTIMATION AND CONTROL, J.S. Meditch, 1969				✓	*	
496. THE STORY OF WORLD WAR II, Stewart Graff, 1978						✓
497. STRANGE SOLDIERING, Richard G. Lawson, 1963	✓					
498. STRATEGY AND ORGANIZATION: TEXT & CASES IN GENERAL MANAGEMENT, Hugo E.R. Uyterhoeven, Robert W. Ackerman, John, W. Rosenblum, 1977				✓		
499. THE STUDY OF WAR..., Quincy Wright, 1942	*	*	*	✓		X

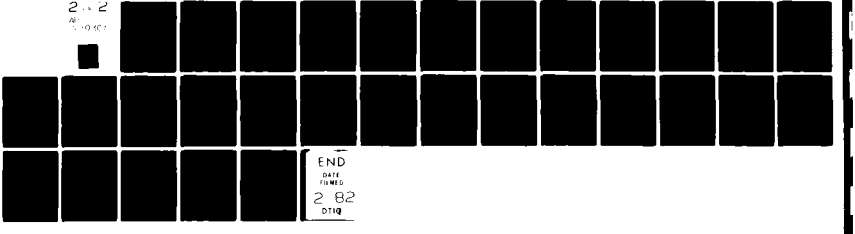
✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

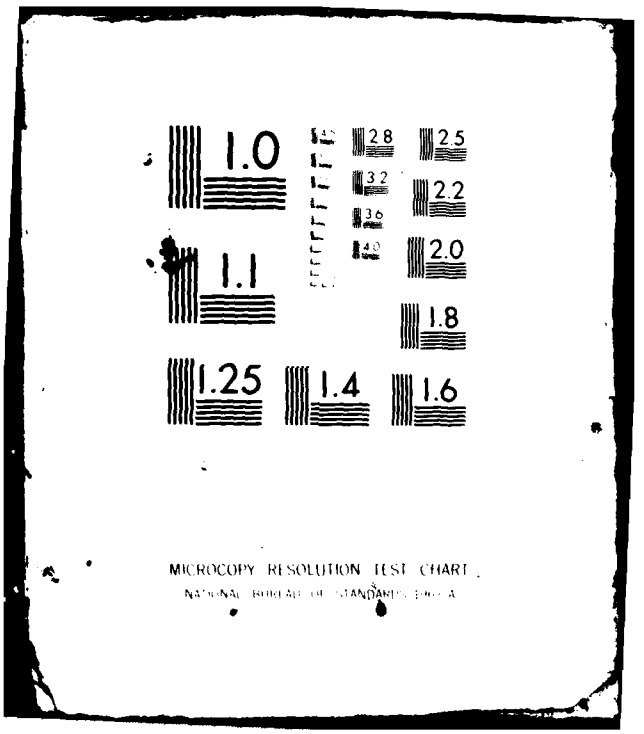
LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
500. SUCCESSFUL HOME REPAIR, Gary Paulsen, 1978			*			✓
501. THE SUCCESSFUL MANAGER IN GOVERNMENT AND BUSINESS, William R. Van Dersal, 1975	*	*	*			✓
502. SUCCESSFUL MIDLIFE CAREER CHANGE; SELF-UNDERSTANDING AND STRATEGIES FOR ACTION, Paula I. Robbins, 1978	✓	*				
503. SUMMONS OF THE TRUMPET, Dave R. Palmer, 1978	*	*	*			✓
504. SURVEY OF REMOTE TERMINAL EMULATORS, Shirley Ward Watkins & Marshall D. Abrams, 1977				✓		
505. SURVIVAL KIT FOR PARENTS OF TEENAGERS, David Melton, 1979			*			✓
506. THE SURVIVORS, Henry Rasmussen, 1977						✓
507. SYSTEMATIC PROGRAMMING: AN INTRODUCTION, Niklaus Wirth, 1973				✓	*	
508. SYSTEM 360 COBOL, Solomon Martin Bernard, 1968	✓				*	
509. THE SYSTEMS ANALYSIS WORKBOOK; A COMPLETE GUIDE TO PROJECT IMPLEMENTATION AND CONTROL, Robert D. Carlsen & James A. Lewis, 1973		*		✓	*	
510. SYSTEMS AND TRANSFORMS WITH APPLICATIONS IN OPTICS, Athanasios Papoulis, 1968					✓	
511. SYSTEMS CONCEPTS..., 1973					✓	
512. THE SYSTEMS VIEW OF THE WORLD; THE NATURAL PHILOSOPHY OF THE NEW DEVELOPMENTS IN THE SCIENCES, Ervin Laszlo, 1972	✓					
513. TACTICAL GENIUS IN BATTLE, Simon Goodenought, 1979		*	✓			*
514. TALL SHIPS, Kathryn Lasky, 1978			✓			
515. TANKS AND OTHER TRACKED VEHICLES IN SERVICE, Brian Terence White, 1978	✓			*		
516. TEACH YOURSELF RUSSIAN, Maximillian Fourman, 1964			✓			
517. THE TECHNIQUE OF FILM ANIMATION..., John Halas, 1968			*		✓	

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

AD-A110 307 ARMY TRADOC SYSTEMS ANALYSIS ACTIVITY WHITE SANDS MIS--ETC F/6 5/2
PILOT ECONOMIC ANALYSIS OF LIBRARY CIRCULATION SYSTEMS.(U)
JUN 81 J A HAWTHORNE, N M STEFONEK
UNCLASSIFIED TRASANA-TD-26-81 SBI-AD-F050 013 NL




1.0
1.1
1.25
1.4
1.6
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.8
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Title, Author, Date	USAADS	SMA	FRMSL	TRASANA	WSTL	WSMSL
518. TELEGRAPH AND DATA TRANSMISSION OVER SHORTWAVE RADIO LINKS: FUNDAMENTAL PRINCIPLES AND NETWORKS, Lothar Wiesner, 1979				✓		
519. TELEVISION SIMPLIFIED, Milton S. Kiver, 1973	*		✓		*	X
520. TEN GREAT MUSICALS OF THE AMERICAN THEATRE, Stanley Richards, ed., 1973			✓			
521. TERRORISM: THEORY AND PRACTICE, Yonah Alexander, ed., 1979		✓	*			*
522. TERRORISM: THREAT, REALITY, RESPONSE, Robert H. Kupperman, [illegible]ell M. Trent, 1979		*		✓		
523. TESTAMENTS C[illegible]ME; THE SEARCH FOR LOST MANUSCRIPTS AND RECORDS, Leo Deuel, 1965			✓			*
524. TESTS IN PRINT II; AN INDEX TO TESTS, TEST REVIEWS, AND THE LITERATURE ON SPECIFIC TESTS, Oscar Krisen Buros, ed., 1974	✓					
525. THEORETICAL NUCLEAR PHYSICS, Amos de Shalit, 1974					✓	
526. THEORIES OF MOTIVATION; FROM MECHANISM TO COGNITION, Bernard Weiner, 1972	✓	*				
527. THEORY OF IONOSPHERIC WAVES, K.D. Yeh, 1972					✓	
528. THEORY OF LINEAR INDUCTION MOTORS, Sakae Yamamura, 1972	*				✓	
529. THEORY OF THERMAL STRESSES, Bruno A. Boley, 1960	*				✓	
530. THERMOSPHERIC CIRCULATION, 1972					✓	
531. 30 SECONDS OVER TOKYO, Ted Lawson, 1943			✓			X
532. THOSE INVENTIVE AMERICANS, National Geographic Society, 1971		*	✓			
533. THREE WAYS OF ASIAN WISDOM: HINDUISM, BUDDHISM, ZEN AND THEIR SIGNIFICANCE FOR THE WEST, Nancy Wilson Ross, 1966			✓			*
534. TIME SERIES ANALYSIS; FORECASTING AND CONTROL, George E.P. Box and Gwilym M. Jenkins, 1970				✓	*	
535. TOPICAL MEETING ON PHOTOACOUSTIC SPECTROSCOPY, 1979					✓	

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
536. THE TOTALED HANDYMAN, Stan Kann, 1980						✓
537. TOUGH-MINDED MANAGEMENT, Joe D. Batten, 1969	✓	X			*	
538. TOWARDS AN AMERICAN ARMY; MILITARY THOUGHT FROM WASHINGTON TO MARSHALL, Russell F. Weigley, 1962	*	*	✓			*
539. TRADE NAMES DICTIONARY..., Ellen T. Crowley, 1979		*			✓	X
540. TRANSPORT PHENOMENA, Robert Byron Bird, 1960	✓		*			
541. TROUBLESHOOTING MICROPROCESSORS AND DIGITAL LOGIC, Robert L. Goodman, 1980						✓
542. THE TRUTH ABOUT CATS, Bernice Thomas, 1979			*			✓
543. THE TWO-CAREER COUPLE: HE WORKS, SHE WORKS, BUT HOW DOES THE RELATIONSHIP WORK?, Francine S. Hall and Douglas T. Hall, 1979	*		✓			*
544. THE UNDERGROUND DICTIONARY, Eugene E. Landy, 1971			✓			
545. UNDERSEA VEHICLES AND HABITATS; THE PEACEFUL USE OF THE OCEAN, Frank Ross, Jr., 1970			✓			*
546. UNDERSTANDING LASERS AND MASERS, Stanley Leinwoll, 1965	✓				*	
547. UNDERSTANDING ORIENTAL PHILOSOPHY; A POPULAR ACCOUNT FOR THE WESTERN WORLD, James K. Feibleman, 1976	*	*	✓			*
548. UNDERSTAND PHILOSOPHY, James Kern Feibleman, 1973		✓	*			
549. UNMASKED! THE STORY OF SOVIET ESPIONAGE, Ronald Seth, 1965	✓	*				
550. UNSOLVABLE CLASSES OF QUANTIFICATIONAL FORMULAS, Harry R. Lewis, 1979					✓	
551. U.S. AIR AND GROUND CONVENTIONAL FORCES FOR NATO: OVERVIEW U.S. Congress, Congressional Budget Office, 1978	✓					
552. THE UNITED STATES ARMY IN THE OCCUPATION OF GERMANY, 1944-1946, Earl Frederick Ziemke, 1975	✓	*		*		*
553. U.S. DEFENSE POLICY: WEAPONS, STRATEGY, AND COMMITMENTS, Congressional Quarterly, 1978	*	*		✓		
554. U.S. FORCE STURCTURE IN NATO: AN ALTERNATIVE, Richard D. Lawrence & Jeffrey Record, 1974		*		✓		

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
555. U.S. NAVY: VIETNAM, Robert D. Moeser, 1969			*			✓
556. UPHOLSTERING FOR EVERYONE, Page Parker, 1976						✓
557. URANIUM PROSPECTOR'S GUIDE, Thomas J. Ballard, 1955						✓
558. THE USE OF FORCE IN INTERNATIONAL RELATIONS, F.S. Northedge, ed., 1974	✓	*				
559. VAN NOSTRAND REINHOLD MANUAL OF RENDERING WITH PEN AND INK, Robert W. Gill, 1973				✓		
560. VENTURE SIMULATION IN WAR, BUSINESS, AND POLITICS, Alfred H. Hausrath, 1971	*			✓		
561. VIBRATING MOLECULES..., Peter Gans, 1971					✓	
562. THE VICTORY; THE SIX-DAY WAR OF 1967, Rafael Bashan, 1967	✓					
563. VIETNAM AND ARMAGEDDON, Robert F. Drinan, 1970			✓			
564. VISUAL DISPLAY TERMINALS: A MANUAL COVERING ERGONOMICS, WORKPLACE DESIGN, ..., A. Caker, 1980				✓		
565. VNR METRIC HANDBOOK, Leslie Fairweather, 1969	✓				*	
566. THE VOLUNTEER ARMY AND ALLIED INTERVENTION IN SOUTH RUSSIA, 1917-1921; A STUDY IN THE POLITICS AND DIPLOMACY OF THE RUSSIAN CIVIL WAR, George A. Brinkley, 1966	✓	*				
567. WAITING-LINE MODELS: AN INTRODUCTION TO THEIR THEORY, AND APPLICATION, Ernesto Ruiz-Pala, Carlos Avila-Beloso & William W. Hines, 1967				✓		
568. WAR THROUGHT THE AGES, Lynn Montross, 1960	✓	*	*	*		
569. WARGAME DESIGN: THE HISTORY, PRODUCTION, AND USE OF CONFLICT SIMULATION GAMES, Strategy & Tactics Magazine Staff, 1977				✓		
570. THE WARSAW PACT; CASE STUDIES IN COMMUNIST CONFLICT RESOLUTION, Robin Alison Remington, 1971	✓	*	*			
571. WARSAW PACT INFANTRY AND ITS WEAPONS..., 1976		*		✓		

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
572. WARTIME ORIGINS OF THE BERLIN DILEMMA, Daniel J. Nelson, 1978		✓				
573. WATFIV FOR HUMANS, Rex Page, 1976						✓
574. WEAPONS & ARMOR, Robert Sietsema, comp., 1978			✓			
575. WEBSTER'S NEW DICTIONARY OF SYNONYMS..., 1968, 1978		X	*		✓	X
576. WEEDS, Mea Allan, 1978			✓			
577. WELLINGTON AT WATERLOO, Jac Weller, 1967			✓			*
578. THE WHITE GENERALS; AN ACCOUNT OF THE WHITE MOVEMENT AND THE RUSSIAN CIVIL WAR, Richard Luckett, 1971	✓					
579. WHOLE EARTH COOKBOOK, Sharon Cadwallander, 1972			*			✓
580. THE WHOLE LIFE DIET, Thomas J. Bassler, 1979			*			✓
581. THE WINTER OF THE BOMBS; THE STORY OF THE BLITZ OF LONDON, Constantine FitzGibbon, 1958	✓					X
582. A WOMAN TALKS TO HER DOCTOR, Charles E. Flowers, 1979			*			✓
583. WONDERS OF THE WORLD, Ronald Clark, 1980			✓			*
584. WORD POWER MADE EASY: THE COMPLETE THREE-WEEK VOCABULARY BUILDER, Norman Lewis, 1969		X	✓			X
585. WORLD ARMOURED FIGHTING VEHICLES, Christopher Foss, 1977		✓		*		
586. THE WORLD IN FERMENT: PROBLEM AREAS FOR THE UNITED STATES, Stanley Lawrence Falk, 1970	*	*		✓		
587. WORLD MILITARY LEADERS, Paul Martell, 1974	✓	*	*			*
588. WORLD POWER ASSESSMENT: A CALCULUS OF STRATEGIC DRIFT, Ray S. Cline, 1975	*			✓	*	
589. WRITING THE TECHNICAL REPORT, Joseph Raleigh Nelson, 1952					✓	
590. THE YANKEE DOUGHBOY, Connell Albertine, 1968			✓			
591. THE YEAR OF THE DINOSAUR, Edwin Harris Colbert, 1977			✓			*

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

LIBRARY DUPLICATION

Title, Author, Date	USAADS	SMA	FBMSL	TRASANA	WSTL	WSMSL
592. YEARS FOR DECISION; A LONGITUDINAL STUDY OF THE EDUCATIONAL AND LABOR MARKET EXPERIENCE OF YOUNG WOMEN, Ohio State University, Center for Human Resource Research, 1971	✓					
593. YESTERDAY, TODAY, AND FOREVER, Jean Dixon, 1975			*			✓
594. THE YOM KIPPUR WAR, Insight Team of the London Sunday Times, 1974	*	*		✓		*
595. ZERO-BASE BUDGETING; A PRACTICAL MANAGEMENT TOOL FOR EVALUATING EXPENSES, Peter A. Pyhrr, 1973	✓	*		*	*	

✓ = submitting library
* = duplicated title
X = earlier or later edition held by library

APPENDIX D

CONCEPT PAPER

Ft Bliss/White Sands Automatic Circulation System

The TRADOC/DARCOM libraries located at Ft Bliss and White Sands Missile Range (WSMR) propose for acquisition an automated circulation and inventory control system. The participating libraries will be the Ft Bliss Morale Support Library, Sergeants Major Academy Learning Resources Center (SMA), Air Defense School Library (USAADS), Ft Bliss Technical Services Branch (TBS), TRADOC Systems Analysis Activity Technical Library, White Sands Technical Library and the White Sands Morale Support Library. The purpose for acquiring an automated, networked circulation system is:

(1) To provide more accurate and efficient control of the library collections.

(2) To improve management of library resources and the efficiency and scope of services rendered to library patrons.

(3) To provide rapid, more efficient, resource sharing among the participating libraries.

(4) To allow more time for professional support of library users, by reducing time consuming, manual operations.

(5) To provide for rapid compilation of bibliographies.

(6) To provide more rapid service to users.

(7) To introduce the efficiencies gained by new technology into these six area libraries in the most economical manner through sharing of automated hardware and software resources.

The proposed system is a fully interactive inventory and circulation control system supported by a minicomputer with networking capability for up to 35 terminals as well as dial-up access. It will be interactive and real-time.

The proposed system must meet the following requirements:

(1) System must be compatible with the TRADOC Library and Information Network (TRALINET) circulation module, including the prototyped Combined Arms Research Library (CARL) Automated Library Information System to be installed at Ft Leavenworth, KS.

(2) The circulation/bibliographic data system must be an off-the-shelf, turn-key system which has been installed and is operating successfully in at least two library environments.

(3) System software must be non-proprietary and written in an ANSI standard language. Program listing and documentation must be available to the library upon request.

(4) System must have the capability of establishing a "private file" within the data base for management of documents records.

(5) System must have a security system which will protect the data base from unauthorized access by a terminal and/or unauthorized operator, prevent unauthorized access to the "private file" and allow only specified individuals to override "blocking" functions of the program.

(6) System must accommodate a full-MARC bibliographic data base of 165,000 titles and a modified MARC data base of 114,000 titles, a patron file of 15,000 and a yearly circulation charge/discharge load of 500,000.

(7) System must allow for acquisition of additional memory storage to handle an estimated growth rate in the data base of 30,000/titles year.

(8) System must be supported by a stand-alone minicomputer dedicated to library operations.

(9) Sixteen work stations (terminals) are required. Ten work stations should comprise a CRT, and an associated printer. Six terminals should be a portable light pen or OCR wand unit to be used for charge/discharge after hours and during system down time.

(10) System must be capable of network interfacing in both the dedicated and dial-up modes.

(11) System must permit maximum accuracy and quality control.

(12) System should be simple enough to be operated by library personnel with a minimal background in programming and computer operations.

(13) System must provide the flexibility to vary patron profiles, report formats and contents for each participating library.

(14) System must be able to accommodate dramatic increases in collection size, number of users, number of transactions, number of locations, and number of work stations without major system redesign.

(15) System must provide the ability to incorporate additional software for system enhancements.

(16) System must provide an interlibrary loan function.

(17) System must provide efficient on-line access by item and patron. Bibliographic data base must be searchable/displayable by, at least, the following keys: author, full title, call number, subject, ISSB, LC card number, and ID number. Patron data base must be searchable/displayable

by, at least, name, borrower type, subject interest, and ID number. Temporary records must be searchable by ID number and title.

(18) System must permit, or must be structured to permit as a future enhancement, Boolean searching of data bases without major file redesign.

(19) System must provide information and availability status for all items in the library's collection.

(20) System must permit availability of use all hours of library operations (0600 - 2200 hours daily).

(21) System must enable staff to charge and discharge library materials quickly and efficiently, and to keep accurate and current records of these transactions.

(22) System must have the ability to produce tapes of databases for the purpose of producing Computer-Output Microform (COM) catalogs.

(23) System must provide a message file capability.

(24) The circulation function of the system must be capable of:

(a) Permitting transaction via data entry by keyboard, OCR and/or bar code read.

(b) Immediate updating to the data base including call number access and access to holds.

(c) Ability to set variant-length loan periods and reset when necessary. (Loan period profile to be determined by each library.)

(d) Ability to determine due date from set loan period, with capability of manual override.

(e) Ability to circulate non-MARC formatted, temporary and/or permanent minimal MARC formatted, and full MARC formatted bibliographic data.

(f) Ability to handle up to 20 types of patrons.

(g) Ability to access information concerning materials charged to an individual borrrower by the borrower's name.

(h) Ability to restrict use of circulation functions by individual library, individual terminals, and/or persons.

(i) Ability to unlink patron identification with item after completion of final transaction, in order to insure patron confidentiality.

(j) Automatic and manual blocking of transactions.

(k) Identification of restricted or blocked borrowers during charge-out.

(l) Abililty to distinguish multiple volumes, multiple copies, and multiple library users of the same call number to permit specific access.

(m) Telephone or in person renewals.

(n) Ability to place holds on items, and determine what titles are being held for patrons, for whom they are being held, and after what date the materials are no longer needed.

(o) Capability of easily posting holds against all circulating copies of a multicopy item (i.e., hold on title) or only against specific copies.

(p) Ability to produce a list of holds in call number, title, author, or patron name order.

(q) Ability to adjust the hold queue.

(r) Ability to produce overdue and recall notices, and to determine what notices have been sent to patrons with materials charged out and what action is to be taken next.

(s) Ability to produce a list in call-number order of all books for which overdue or recall notices are scheduled to be sent.

(t) Ability to print date due slips in real-time.

(u) On-line and batch printing capability for generation of notices and reports.

(v) On-line message displays.

(w) Ability to reserve a book.

(x) Ability to print notices in multiple copy.

The acquisition of this proposed system will be accomplished in the following steps:

Phase I - Formulation and Analysis

- Step 1 - Formulation of concept paper and preliminary staffing at all local levels and with TRALINET Systems Center
- Step 2 - Designation of Project Manager
- Step 3 - Survey of systems available on the commercial market and evaluation of these system

Step 4 - Cost analysis of proposed automated system and currently operating circulation systems at all sites
Step 5 - Evaluation of concept paper and cost analysis, and finalization of proposal

Phase II - Approvals

Step 1 - Obtain approval of project from all local management levels
Step 2 - Investigate funding sources and obtain funding approval
Step 3 - Obtain AR 18-1 approval from HQS TRADOC (to be coordinated with TRALINET Systems Center)

Phase III - Conversion

Step 1 - Begin Ft Bliss library system's participation in TRALINET Shared Cataloging Project for monographic and serial items
Step 2 - Convert TRASANA Database into machine-readable format of new system
Step 3 - Begin retrospective monographic and serial conversion project for Ft Bliss and White Sands libraies system

Phase IV - Procurement

Step 1 - Develop technical specification in accordance with AR 18-1 for procurement
Step 2 - Begin procurement cycle

Phase V - Acquire, test, and activate system

Phase VI - Begin ongoing maintenance of system

Phase VII - Activate DARCOM libraries into circulation system

APPENDIX E

JUSTIFICATION TO ACQUIRE STANDARD ADPE

SECTION I - IDENTIFICATION

1. Assigned Responsible Agency: USA TRADOC Systems Analysis Activity (TRASANA), White Sands Missile Range, NM 88002 (Project Manager)

2. PMP Guidance Document: NA

3. Designation and location of units that will operate the ADPE:

   a. CPU and peripherals - Will be located on Ft. Bliss. The exact location will be determined at a later date.

   b. White Sands Missile Range, NM:

      (1) USA TRASANA Technical Library (TRASANA):

          2 - CRT terminals with OCR wand and printer.
          1 - portable terminal.

      (2) White Sands Technical Library (WSTL):

          2 - CRT terminals with OCR wand and printer.
          1 - portable terminal.

      (3) White Sands Morale Support Library:

          1 - CRT terminal with OCR wand and printer.
          1 - portable terminal.

      (4) USA Air Defense School Library (USAADS):

          3 - CRT terminals with OCR wand and printer.
          1 - portable terminal.

      (5) USA Sergeants Major Academy Learning Resources Center (SMA):

          1 - CRT terminal with OCR wand and printer.
          1 - portable terminal.

      (6) Ft. Bliss Moral Support Library:

          1 - CRT terminal with OCR wand and printer.
          1 - portable terminal.

4. Title and number of authorization documents for operating units:

   a. TRASANA: TDA Number: TCW2Y6AA
      UIC Number: W2Y6AA

   b. White Sands: TDA Number: XMW04WAA
      UIC Number: W04WAA

   c. Ft. Bliss: TDA Number: TCWOVHAA
      UIC Number: WOVHAA

   d. SMA: TDA Number: TCW3QTAA
      UIC Number: W3QTAA

   e. USAADS: TDA Number: TCW1D2AA
      UIC Number: W1D2AA

5. DPI Code:

   a. TRASANA: R039
   b. White Sands: T708
   c. Ft. Bliss: R303
   d. TRADOC (TRALINET): R031

SECTION II - SYSTEMS INFORMATION

6. Current requirements:

a. BACKGROUND: In 1979, the TRASANA Technical Library began discussions with the TRALINET Systems Center regarding the feasibility of fully automating its circulation system. Due to the small size of the collection, the cost of a stand-alone automated circulation could not be justified. A second alternative of networking the four TRADOC libraries into one system was proposed in August 1980. A concept paper was developed and an economic analysis of the present and proposed systems was initiated. In February 1981, the proposed concept was broadened to include participation by two DARCOM libraries located on the White Sands Missile Range.

The purposes for acquiring an automated, networked circulation system are:

(1) To provide more accurate and efficient control of the library collections.

(2) To improve management of library resources and the efficiency and scope of services rendered to library patrons.

(3) To provide rapid, more efficient, resource sharing among the participating libraries.

(4) To allow more time for professional support of library users by reducing time consuming, manual operations.

(5) To provide for rapid compilation of bibliographies.

(6) To provide more rapid service to users.

(7) To introduce the efficiencies gained by new technology into these six area libraries in the most economical manner through sharing of automated hardware and software resources.

b. CURRENT INADEQUACIES (MANUAL OPERATIONS): The circulation functions of filing book and patron cards, locating misfiled cards, identifying overdue items and typing overdue notices, typing accessions lists, and identifying and listing checked out items for patrons who are clearing post are highly labor intensive operations. The amount of time spent on these operations significantly decreases the amount of staff time available for assisting the patron.

Other operations which are inadequate for meeting patron needs are:

(1) The procedure for placing a reserve or hold on an item is cumbersome and time consuming for the patron as well as the library staff.

(2) In most systems, it is difficult for the library staff to determine immediately the status or location of an item in the collection.

(3) The process of Interlibrary Loan is time consuming, complicated and may be inaccurate. If a needed item is not in the library's collection, each area library must be contacted by phone. Once a copy is located, an Interlibrary Loan form must be typed. The receiving library either sends the item or notifies the requesting library of its non-availability.

(4) Detailed or multi-level subject searching is not available. A patron must use broad terms, make a list of those items with possible application, and pull the items to determine which are pertinent. In three of the libraries, a patron must search two different catalogs in order to locate all items on a specific subject.

(5) There is no adequate method for determining what materials have been ordered by other area libraries.

c. CURRENT INADEQUACIES (AUTOMATED BATCH OPERATION): Due to volume, the data base is updated on a monthly basis. This leaves recently borrowed and newly received documents in limbo for a month or more. Because of this slow turn around time, manual back up files are kept. The volume of computer printouts is becoming excessive. Also, in order to insure file integrity, the input data goes through several manual verification processes.

d. MANPOWER: The libraries of the proposed system are experiencing difficultes in meeting the current demands. Over the last 5 years the workloads of these libraries have increased by 20 - 50%. In 1980 the TRADOC libraries added a search service of two data bases - Lockheed's DIALOG and the Defense RDT&E On-Line System. Not only do the searches entail staff time but the resultant bibliographies increase the workload in the acquisition, Interlibrary Loan, and cataloging operations. In the recent manpower survey, three of the TRADOC libraries justified an additional space.

A recent survey by the school and technical libraries of the proposed system has shown an overwhelming need for a Selective Dissemination of Information (SDI) Program. Implementation of an SDI Program would entail an increase of one to three people for each library. In the last 4 years the Technical Services Branch at Ft. Bliss has lost two people. This loss has increased the request to shelf time by 50%. Due to manpower shortages, the Ft. Bliss Morale Support Library had to decrease the hours of operation at the main library and close its branch library.

e. GENERAL SYSTEM REQUIREMENTS: The proposed system is a fully interactive inventory and circulation control system supported by a minicomputer with networking capability for up to 35 terminals as well as dial-up access. It will be interactive and real-time.

The proposed system must meet the following requirements:

(1) General system and administration:

(a) System must be compatible with the TRADOC Library and Information Network (TRALINET) circulation module, including the prototyped Combined Arms Research Library (CARL) Automated Library Information System to be installed at Ft Leavenworth, KS.

(b) The circulation/bibliographic data system must be an off-the-shelf, turn-key system which has been installed and is operating successfully in at least two types of library environments, e.g., academic, special, or public.

(c) Full program documentation must be provided at installation with updates provided as published.

(d) System must be supported by a stand-alone minicomputer dedicated to library operations.

(e) System must permit availability of use of all hours of library operations (0600 - 2200 hours daily).

(f) Training Program Requirements.

° Formal training program by vendor on the use of the system as a part of the standard contract.

° Formal training on the computer language utilized.

° Staff manual(s) provided.

° Patron-orientation materials provided.

(g) System must be capable of network interfacing in both the dedicated and dial-up modes.

(h) System must have the ability to produce tapes of databases for the purpose of producing Computer-Output Microform (COM) catalogs.

(i) System must provide full back-up and recovery of all data files.

(2) Hardware requirements:

(a) System must accommodate a current full-MARC bibliographic data base of 165,000 titles and a modified MARC data base of 114,000 titles , a patron file of 15,000 and a yearly circulation charge/discharge load of 500,000. System must allow for an estimated growth rate of 30,000/titles year over an eight year period.

(b) Sixteen work stations (terminals) are required. Ten work stations should comprise a CRT, and an associated printer. Six terminals should be a portable light pen or OCR wand unit to be used for charge/discharge after hours, and during system down time.

(c) System must be able to accomodate dramatic increases in collection size, number of users, number of transactions, number of locations, and number of work stations without major system redesign.

(3) Software requirements:

(a) The user interface should be simple enough to be operated by library personnel with a minimal background in programming and computer operations.

(b) System must provide Boolean request display capability for the following keys: author, full title, call number, subject, ISSN, ISBN, LC card number, item ID number, patron name, borrower type, subject interest, and patron ID number. Temporary records must be searchable by item ID number or title.

(c) System must provide an electronic mail capability for interlibrary loan function.

(d) The circulation function of the system must be capable of:

° Permitting transaction via data entry by keyboard, OCR and/or bar code read.

° Immediate updating to the data base including call number access and access to holds.

° Ability to set variant-length loan periods and reset when necessary. (Loan period profile to be determined by each library.)

° Ability to determine due date from set loan period, with capability of manual override.

° Ability to circulate non-MARC formatted, temporary and/or permanent minimal MARC formatted, and full-MARC formatted bibliographic data.

° Ability to handle up to 20 types of patrons per library.

° Ability to access information concerning materials charged to an individual borrrower by the borrower's name.

° Ability to restrict use of circulation functions by individual library, individual terminals, and/or persons.

° Ability to unlink patron identification with item after completion of final transaction, in order to insure patron confidentiality.

° Automatic and manual blocking of transactions.

° Identification of restricted or blocked borrowers during charge-out.

° Abililty to distinguish multiple volumes, multiple copies, and multiple library users, of the same call number to permit specific access.

° Telephone or in person renewals.

° Ability to place holds on items, and determine what titles are being held for patrons, for whom they are being held, and after what date the materials are no longer needed.

° Capability of easily posting holds against all circulating copies of a multicopy item (i.e., hold on title) or only against specific copies.

° Ability to produce a list of holds in call number, title, author, or patron name order.

° Ability to adjust the hold queue.

° Ability to produce overdue and recall notices, and to determine what notices have been sent to patrons with materials charged-out and what action is to be taken next.

° Ability to produce a list in call number order of all books for which overdue or recall notices are scheduled to be sent.

° Ability to print date due slips in real-time.

° On-line and batch printing capability for generation of notices and reports.

° On-line message displays.

(e) The reserve function of the system must be capable of:

° Ability to place and cancel reserves on individual items.

° Ability to link reserved item to a particular course, faculty member, or patron.

° Ability to circulate books for an hourly, overnight, daily, weekly, or other loan period from the linked course, faculty member, or patron to other patrons.

° Ability to place holds on reserve books.

° Ability to trace book to course, faculty member, or patron through item query.

° Ability to list books on reserve by course number, faculty member, or patron.

° Circulation statistics for the number of times each item was borrowed, tied to course, faculty member, or patron.

(f) Data Base Creation/Maintenance Requirements:

° Ability to load MARC - and alien-formatted records into the data base. System must accept variable length records consisting of fixed- and variable-length fields.

° Ability to accept full OCLC/MARC records.

° On-Line and batch maintenance, edit, and update of circulation, bibliographic, and patron data bases.

° Ability to create a bibliographic working file by individual library or by a network of libraries.

° Efficient transaction and data base backup system to allow complete recovery after system failure.

(g) Management Information Requirements:

° The production of circulation statistics by: day, week, month, or year (including ability to cumulate), borrower type, classification number, call number group (e.g., Dewey 300's or Library of Congress UF's), and computer terminal.

° Ability to identify frequently and infrequently circulated titles.

° Capability of retaining historical record of item transactions and patron data, other than personnel identification, associated with these items, including latest date of circulation of item.

° Borrower statistics, including totals for each type and number of active borrowers.

° Cumulative Interlibrary Loan statistics by items loaned and items requested for each library in the network.

° The production of cataloging statistics by day, week, month or year (including ability to cumulate for number of titles), number of volumes, titles and call number groups (by reference and circulating collections).

° Ability to identify titles added to the collection within the following groups: latest month, latest year, and library and produce title listing on a monthly basic.

(4) Security requirements:

(a) System must provide confidentiality of patron records to meet the requirements of the Privacy Act.

(b) System must have a security system which will protect the data base from unauthorized access by a terminal and/or unauthorized operator, prevent unauthorized access to the "private file", and allow only specified individuals to override "blocking" functions of the program.

8. DETAILED JUSTIFICATION:

a. Resource Sharing

One of the major benefits of a consolidated, automated circulation system is the sharing of collection resources and the avoidance of unnecessary duplication of titles. In the TRASANA Library Circulation System - Economic Analysis Project, a study was made of the percentage of duplication among the collections of the six area libraries. Each library contributed 100 titles. A master list of titles was cumulated and each library checked the cumulated title list against their card catalog. The results of this study show a 48.8% duplication of open literature titles. 28.8% of the duplication is necessary

or unavoidable duplication in the areas of reference, mission essential materials needed on a daily basis or in support of a curriculum, and book kits for morale support libraries. The librarians involved feel that 20% of this duplication was unnecessary. The value of the existing collection in regard to resource sharing is determined by the following equation:

$$\frac{\textit{total titles - 20\% duplication - 1/6 of titles}}{2^1} \times \textit{average published cost of a non-fiction book}$$

[1]*NOTE: It was felt that only half of the total collection would be of value to any one library.*

For the proposed system this cost is:

$$\frac{165{,}000 - 33{,}000 - 22{,}000 \times \$23.57}{2} = \$1{,}296{,}350.00$$

The projected annual duplication savings for the system are determined by:

20% duplication factor of total titles ordered/yr. x avg book price

OR

$$1{,}800 \times \$23.57 = \$42{,}426.00^2$$

[2]*NOTE: In 19.2% of the duplication 3-5 libraries held the title. There was no weighting factor included for this additional duplication.*

This money can be reapplied in expanding the collection coverage. The total dollar savings over the 8 year period = $1,635,758.00 [existing collection savings + (annual savings x 8 years) = total savings]

b. Selective Dissemination of Information (SDI)

As part of the Library Circulation System - Economic Analysis study, a survey was taken as to the need for an SDI Program. Under such a program an individual would establish a list of subject areas in which he/she is interested. The library staff would review incoming periodicals, books, technical reports, etc. for articles or chapters on these subjects. For the survey, four possible user populations were identified.[3]

[3]*NOTE: Samples for the survey were taken as follows: TRASANA = 20% of technical personnel, USAADS = 20% of Directorate for Training and Doctrine personnel, SMA = 100% of lesson authors/faculty members, WSMR = 5% of the personnel listed on the WSMR Technical Library Patron Register.*

Random numbers within each population were selected by the computer and questionnaires were distributed. On the questionnaire each person was asked how much time such a program would save them per month, to rate the value of the program and their hourly pay rate. Response from the questionnaires indicated that the program was needed and would be used by from 60 - 87% of

the users. Listed below are the statistics derived for each population. The total manyears save in each user population is calculated by:

$$\frac{\textit{Total users of the service x avg time saved/month x 12 month}}{\textit{2080 hours}} = \textit{total manyears saved}$$

The total dollar value of the manyears saved for each user population is determined by:

total manyears x average annual salary = total dollar savings

USAADS

total manhours (from survey) = 341.74 hrs

avg time/individual = 8.14 hrs/mo.

% would use service = 60.8% (221 people)

sample population (20%) = 363 people

total dollars (from survey) = $427.98 (42 items)[4]

avg dollars/individual = $10.19 (avg salary for USAADS)

total manyears = $\frac{221 \text{ people x } 8.14 \text{ hrs x } 12}{2080}$ = 10.38 manyears

total dollars = 10.38 x $21,195.20 = $220,006.17

[4]*NOTE: Avg dollars/individual is computed by totaling the hourly pay rate listed on each questionnaire and dividing the total dollars by the number of questionnaires.*

SMA

total manhours (from survey) = 217.0 hrs

avg time/individual = 8.04 hrs/mo.

% would use service = 87% (27 people)

sample population (100%) = 31 people

total dollars (from survey) = $336.77 (27 items)

avg dollars/individual = $12.47

$\frac{27 \text{ x } 8.04 \text{ x } 12}{2080}$ = 1.25 manyears

1.25 x $25,937.60 = $32,422.00

TRASANA

total manhours (from survey) = 94.25

avg. time/individual = 4.28 hr/mo.

% would use service = 73.3% (183 people)

sample population (20%) = 249 people

total dollars (from survey) = $334.12 (22 items)

avg dollars/individual = $15.19

$\frac{183 \times 4.28 \times 12}{2080}$ = 4.52 manyears

4.52 x $31,595.20 = $142,810.30

White Sands

total manhours (from survey) = 277.75 hrs.

avg. time/individual = 5.91 hrs/mo.

% would use service = 67.1%[5] (704 people)

sample population (5%) = 3520 people

total dollars (from survey) = $666.14 (47 items)

avg. dollars/individual = $14.17

$\frac{704 \times 5.91 \times 12}{2080}$ = 24.00

24.00 x $29,473.60 = $707,366.40

System Savings:

Total manyears saved/yr = 40.15

Total dollar savings/yr = $1,102,604.87

[5]*NOTE: Only 20% will be used because of small sample size and administrative type people possible in the sample.*

The libraries can not implement the SDI Program without a large increase in the staff of each participating library. If the automated system is available, this additional manpower would not be required.[6]

[6]*NOTE: The requirement for no additional manpower is based on automating the comparison area of the SDI Program and sharing the indexing duties among the four libraries.*

Library Cost = 2.4 manyears x $19,122.92[7] = $45,895.01

[7]*NOTE: Salary based on a GS7/05 library technician.*

Since the manyear savings shown above are spread across the user population and tied to individual users, there would be no manpower space saving involved. Instead the time will be more profitably applied in the research, analysis or instruction areas of the missions. The results should be a better quality output, e.g., class instruction, studies, or project results.

Total annual savings of the SDI Program is:

$$\frac{\text{Total dollar savings/yr - library costs}}{2^{8}} = \text{total savings}$$

OR

$$\frac{\$1,102,604.87 - \$45,895.01}{2} = \$528,354.93$$

[8]*NOTE: The total savings in dollars and manpower are divided in half because part of the time could be off duty hours.*

Total manpower savings of the SDI Program is:

$$\frac{\text{Total manyears saved/yr - library manyears}}{2} = \text{total savings}$$

OR

$$\frac{40.15 - 1.6}{2} = 19.28 \text{ manyears}$$

c. Automated Circulation System:

In order to determine the costs of the manual circulation system, the six libraries conducted a timing exercise spread out over a 2 - 3 week period. From this timing and the statistics kept by each library, a cost was developed for each operation. The costs for these same operations were calculated for the automated system. Times were based on information supplied by the Boulder Public Library regarding their automated circulation system. Supplies were estimated and maintenance was based on each library supplying 1/6 of the annual maintenance costs.

There is a calculated annual cost savings of $19,373.52 per year and 3.22 manyears saved with use of the proposed automated circulation system. Shown below is a comparison of the manual vs the automated system. Following this are detailed charts for the cost of each operation listed by library and type of operation.

Besides saving staff time the faster system would be saving the time of the patron. This time savings can be derived by:

$$\frac{\text{charging time for manual} - \text{charging time for automated}}{60} \times \text{total items charged} = \text{total manhours saved}^{9}$$

AND

total manhours saved x hourly pay rate for organization = total dollars saving

$$TRASANA = \frac{1.42 - 0.10 \times 16001 \times \$15.71}{60} = \$5,530.23$$

$$USAADS = \frac{0.86 - 0.10 \times 70964 \times \$10.19}{60} = \$9,159.59$$

$$WSTL = \frac{0.80 - 0.10 \times 16004 \times 12.92}{60} = \$2,412.29$$

$$SMA = \frac{0.75 - 0.10 \times 9583 \times \$10.00}{60} = \$1,038.20$$

Therefore the total manyears saved are .74[9] (total manhours/2080 hrs) at a cost of $18,140.31.

[9]*NOTE: Patron time saved for the two morale support libraries was not included because this time would mainly be off-duty hours.*

Since the manyear savings shown are spread across the user population and tied to an individual user there would be no manpower space saving involved. Instead the time will be more profitably applied in the research, analysis or instruction areas of the missions. The results should be a better quality output, e.g., class instruction, studies, or project results. The library staff time saved will be reapplied in implementing the SDI Program, expanding assistance to the patron and expanding the special programs of the morale support libraries.

Total annual savings of the circulation system operations is:

total patron $ saved + total library staff $ saved

OR

$18,140.31 + $19,373.52 = $37,513.83

SUMMARY OF COST AVOIDANCES SAVINGS (1st YEAR)

Resources Sharing[9]	$ 474,542.66
SDI Program	528,354.93
Automated Circulation System	37,513.83
Total Cost Avoidance Savings	$1,040,411.42

[9]*NOTE: Full amortization is based on total conversion of the open literature collection of all libraries. Value of the existing collection is pro-rated over a three year period since the collection conversion is expected to take 3 years.*

ADPE LEASE VERSUS PURCHASE ANALYSIS

(1) Reporting DPI: TRASANA

(2) DPI Number : R039

(3) Computer Conf: Data General

(4) Computer Conf No:

(5) Project Release Date: Unk

(6) Preparation Date: 6 April 81

(7) Point of Contact: Judy Hawthorne
AV 258-3135

(8) Option Date: Sept 83

(9) Economic Life of ADPE: 8 years

(10) Discount Rate: 10%

(a) Project Number:

(b) Appropriation: OSD PIF (FY83)

(c) Quantity: 001

(d) Model Number: Data General

(e) Model Name: Mini Plus Library Software Package

(f) Date of Installation: Sept 83

(g) Remaining Economic Life: 8 years

(h) Adjusted Unit Purchase Price: $501,592.00

(i) Salvage Value: $100,318.40

(j) Annual Maint. Cost (Pur): $35,292.00

(k) Annual Lease Cost (Incl. Maint): $215,865.12

(l) Present Value of Purchase: $393,752.10

(m) Present Value of Leasing: $1,208,197.00

(n) Ratio of Leasing/Purchase: 3.1

COMMENT: Although vendor and equipment have not been selected, analysis is based on a configuration from the circulation/inventory control system in an operating library. Some possible vendors are: CL Systems, Newtonville, MA, DataPhase, Systems, Inc., Kansas City, MO, and The Army Library System (Lister Hill National Center for Biomedical Communication).

8. Estimated one-time costs

ADPE/Communications Equipment/Software Package	$501,592.00
Site preparation (air conditioning)	5,000.00
Data conversion	369,174.00
Programming, testing, and debugging SDI Program	10,000.00
TOTAL	$885,766.00

9. Funding for ADPE: Funding has been requested under the OSD Productive Investment Funding (PIF) program for FY83 funding.

SECTION IV - ADP RESOURCES SHARING

10. There are no ADP resources available in this area for sharing for the following reasons :

a. The requirements of this request call for a complete system to include software which will operate on vendor-supplied hardware.

b. System must work with full MARC bibliographic records fully compatible with OCLC, Inc., in Columbus, Ohio, the source of shared cataloging information for TRALINET and the proposed network.

c. The type of terminals required by the system include use of the wand for data input. This type of protocol and interface does not presently exist on local ADP equipment.

d. No local ADP equipment has a capacity to except a data base of this size with its projected workload without modifications.

11. All proposed ADP equipment will be installed at existing DPIs.

SECTION V - MOBILIZATION, ALTERNATE SITE, AND CONTINUITY OF OPERATIONS

12. NA

13. NA

14. NA

SECTION VI - ASSISTANCE THROUGH CONTRACTURAL ARRANGEMENTS

15. NA

SECTION VII - TIME-PHASE SCHEDULE

16. Schedule dependent on approval of funding; APDE is required within 90 days of close of fiscal year in which system is funded.

SECTION VIII - ALTERNATIVE DATA PROCESSING METHODS CONSIDERED

17. There are only two methods available for the performance of these types of operations - manual and automated.

BIBLIOGRAPHY

1. Barkalow, Pat, "Conversion of Files for Circulation Control", Journal of Library Automation, volume 12/3, September 1979, pages 209-213.

2. Boss, Richard W., "Circulation Systems: The Options", Library Technology Reports, volume 15/1, January-February 1979, pages 12-105.

3. Boss, Richard W. and Deanna B. Marcum, "The Library Catalog: COM and On-Line Options", Library Technology Reports, volume 16/5, September-October 1980, pages 491-549.

4. Butler, Breet, Brian Aveney and William Scholz, "The Conversion of Manual Catalogs to Collection Data Bases", Library Technology Reports, volume 14/2, March-April 1978, pages 109-206.

5. Corbin, John B., "Planning and Automation Program", Proceedings Second Texas Conference on Library Automation, March 27, 1969, pages 58-73.

6. Mosley, Isabel Jean, "Cost-Effectiveness Analysis of the Automation of a Circulation System", Journal of Library Automation, volume 10/3, September 1977, pages 240-254.

7. Nelson, Bonnie R., "Implementation of On-Line Circulation at New York University", Journal of Library Automation, volume 12/3, September 1979, pages 219-231.

8. Randall, G. E. and J. G. Oxton, "A Mechanized Library Ten Years Later", Special Libraries, volume 64/2, February 1973, pages 76-80.

9. Matthews, Joseph R., "Turnkey Automated Circulation Systems: Comparative Information", Joseph Mathews, Publisher, Cypress, California, 1980.

10. Tape 80107-201, "Automated Circulation Systems: Planning, Implementation and Use", 1980 American Library Association Annual Conference presented at New York City, New York, June 1980.

11. Tape 80107-031, "Planning for Library Automation", 1980 American Library Association Annual Conference presented at New York City, New York, June 1980.

12. Tape 80107-461, "The Potential of On-Line Circulation Systems as Public Catalogs", 1980 American Library Association Annual Conference presented at New York City, New York, June 1980.

ACRONYMS

ADPE - Automatic Data Processing Equipment

ANSI - American National Standards Institute

CARL - Combined Arms Research Library, Ft Leavenworth, KS

COM - Computer Output Microfilm

CRT - Cathode Ray Tube

DARCOM - US Army Development and Readiness Command, Alexandria, VA

FBMSL - Ft Bliss Morale Support Library, Ft Bliss, TX

ISBN - International Standard Book Number

ISSN - International Standard Serial Number

LC - Library of Congress

MARC - Machine Readable Cataloging

OCLC - On-Line Computer Library Center, Columbus, OH

OCR - Optical Character Reader

RLIN - Research Libraries Information Network

SDI - Selective Dissemination of Information

SMA - US Army Sergeants Major Academy, Ft Bliss, TX

TLIB - Technical Library Data Base

TRADOC - US Army Training and Doctrine Command, Ft Monroe, VA

TRALINET - TRADOC Library and Information Network

TRASANA - US Army TRADOC Systems Analysis Activity, White Sands Missile Range, NM

USAADS - US Army Air Defense School, Ft Bliss, TX

WSMSL - White Sands Missile Range Morale Support Library, White Sands Missile Range, NM

WSTL - White Sands Missile Range Technical Library, White Sands Missile Range, NM

GLOSSARY

Accession list - A published list of new items added to a library's collection over a specified period of time.

AG publications - Publications which are published and distributed by the Adjutant General Publication channels.

Batch process - Process of accumulating transactions and submitting them to the computer at one time.

Blocking function - Process of prohibiting the completion of a transaction under specified conditions.

Boolean search - Use of Boolean logic statements, usually AND, OR, or NOT, to establish the structure of a search.

Borrower's card - Card on which is recorded information on items that an individual has checked out of the library.

Charge - All library operations included in the process of checking out an item.

Circulation - Process used to lend and return library materials and to maintain the necessary records.

Clearance - Process of identifying any library materials held by an individual who is leaving the library's jurisdiction.

Dedicated mode - Manner in which a terminal is exclusively linked to one computer.

Dial-up mode - Manner in which a terminal may be linked to one or more computers via telephone lines.

Discharge - All library operations included in the process of returning an item.

Documents - Technical reports generated by the Department of Defense and its contractors.

Keyboarding - Process of inputting data to a computer via a typewriter keyboard.

Media form - Form of the material in which the item is published, e.g., hardcopy, paperback, microfiche, record, etc.

On-Line system - System in which the user interacts directly with the computer.

Open literature - All materials in a library which have no limitation as to who may see them, e.g., books, periodicals, records, etc.

(Glossary - Cont)

Patron card - Same as a borrower's card.

Private file - Data file which is available to the library staff only.

Reader's advisory - That portion of the reference service concerned with recommending reading material to patrons.

Real-time - Provision of data to a user at the time the query is made.

Reference - Library services involved in the answering of patron questions.

Reserve - Process of placing an item in the library's collection on hold.

Search - Process of identifying the location and/or availability of an item in the library's collection.

Serial - Publication issued in successive parts in regular or irregular intervals on a continuing basis.

Turn-around time - Time from transmission of a query to a computer to the time the requested data are displayed.

Turn-key system - System in which all parts of a computer system are provided by a vendor, including hardware, software, training, and maintenance.

DISTRIBUTION LIST

	Number of Copies
HQDA (DAAG-AL)	1
HQDA (DAEN-ASI)	1
HQDA (MSL)	1
Commander	
DARCOM (DRXAM-L)	1
FORSCOM (AFPR-PSR)	1
TRADOC (ATPL-AOL)	5
USAADC & Ft Bliss (ATZC-PAM)	2
USACAC & Ft Leavenworth (ATZLPA-CL-ML)	1
USAREUR (AEUPE-AMD-AL)	1
USARSOK	1
WSMR	
STEWS-DP-AL	1
STEWS-DP-ML	1
Commandant	
USAADS (ATSA-DTM-L)	1
USASMA (ATSS-DT-LRC)	1
Director	
USATRASANA	
ATAA-SL	10
ATAA-TDA	1
DTIC (DTIC-DDA-2)	2
The Army Library (ANRAL-RS)	1